

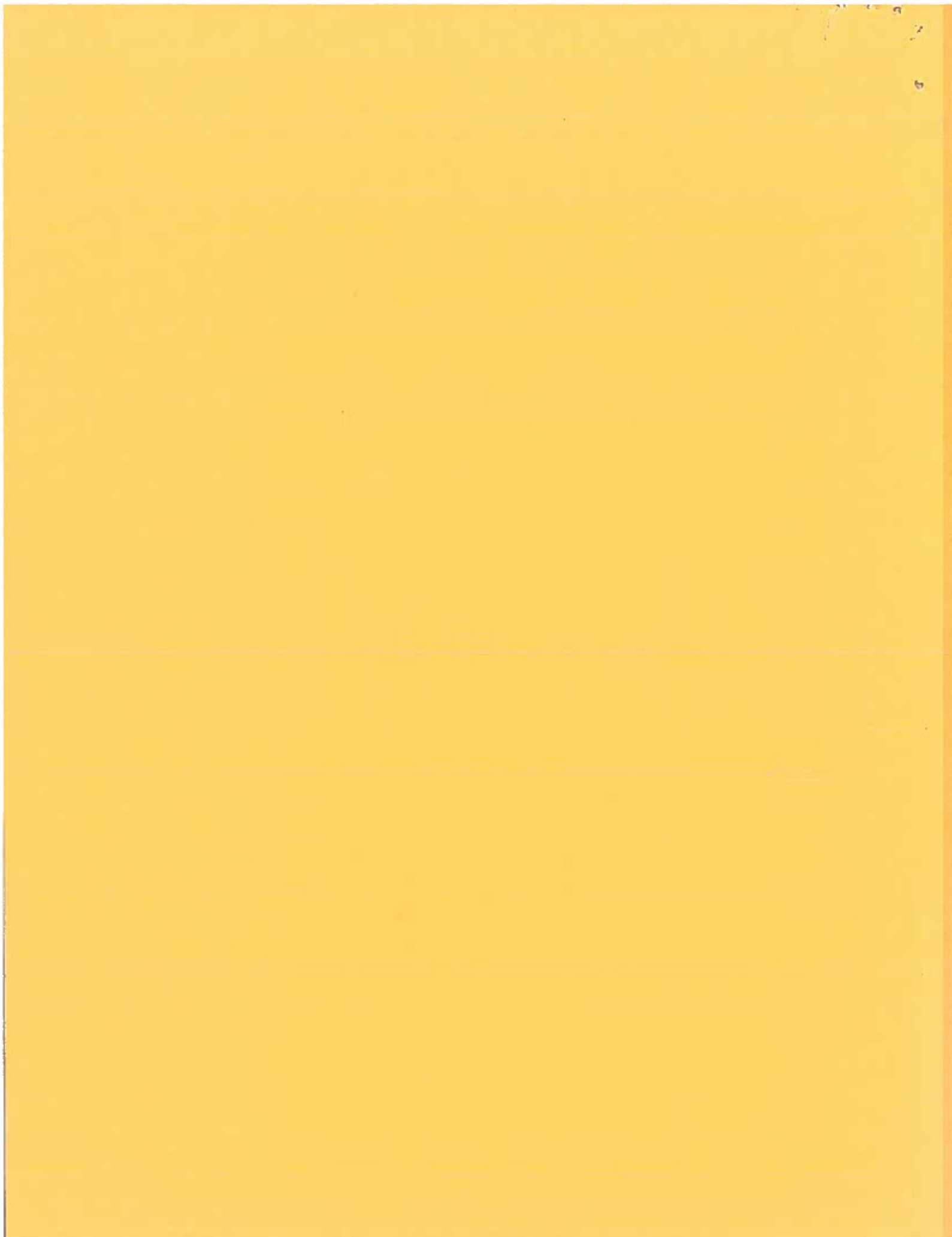
CANADIAN ASSOCIATION FOR PHYSICAL ANTHROPOLOGY

34th ANNUAL MEETING

PETERBOROUGH, ONTARIO

OCTOBER 25-28, 2006

HOSTED BY TRENT UNIVERSITY



34th ANNUAL CAPA CONFERENCE
Peterborough, Ontario
October 25th-28th, 2006

Wednesday October 25th

5:30-8:30 Registration
6:30-9:00 Welcome Reception (Garden Court)

Thursday October 26th

08:30-10:30 Session 1: The Anthropology of Infectious Disease
10:30-10:45 Coffee Break
10:45-12:30 Session 2: Skeletal Biology and Dental Anthropology
12:30-1:30 Lunch
1:30-3:45 Session 2: Skeletal Biology and Dental Anthropology, continued
3:45-4:00 Coffee Break
4:00-6:00 Session 3: Palaeopathology

Friday October 27th

08:30-10:30 Session 4: Forensic Anthropology: Past, Present, and Future
10:30-10:45 Coffee Break
10:45-12:15 Session 5: Collaborative Health Research in Aboriginal Communities
12:15-1:30 Lunch
1:30-3:15 Session 6: Bone Chemistry
3:15-3:30 Coffee Break
3:30-5:00 Session 7: Variations on a Theme: 3D Visualization in Biological Anthropology
5:00 Business Meeting
6:30 Pre-dinner reception (Garden Court)
7:30 Banquet (Regency Ballroom)

Saturday October 28th

09:00-10:30 Session 8: Primatology
10:30-10:45 Coffee Break
10:45-12:00 Session 8: Primatology, continued
12:00-12:15 Closing Remarks

SCIENTIFIC PROGRAM

Thursday October 26th, 2006

08:30-10:30	Session 1: The Anthropology of Infectious Disease Organizer and Chair: Dr. Tracy Farmer, Dept. of Anthropology, McMaster University
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- 08:30-08:45 Farmer, Tracy. Decline and Death at York Factory, 1880-1920.
- 08:45-09:00 Stoops, Melissa. Health Conditions at Norway House Residential School, 1900-1946.
- 09:00-09:15 Larcombe, Linda, Dembinski, Iga, Larcombe, Erin, Milligan, Leisel, Orr, Pam, Nickerson, Peter. The Analysis of Candidate Genes and their Influence on Tuberculosis Susceptibility in a Canadian Aboriginal population: some Preliminary Results.
- 09:15-09:30 Abonyi, Sylvia. Towards a northern Saskatchewan Strategy for Handling the Emergence of HIV/AIDS and Hepatitis C: An Exploration of Perception, Experience, and Response Capacity in four Aboriginal Communities
- 09:30-09:45 Korol, Ellen E. and Herring, D. Ann. The North/South Divide: Social Inequality and Mortality from the 1918 Influenza Pandemic in Hamilton, Ontario.
- 09:45-10:00 Padiak, Janet. Changes in Infectious Disease Morbidity During the Second Epidemiological Transition.
- 10:00-10:15 Sawchuk, Larry and Burke, Stacie. Health, Disease and the Colonial Experience: Malta and Gibraltar.
- 10:15-10:30 Walz, Leah and Sawchuk, Larry. Malta: A Giant Step Behind in the Epidemiological Transition.
- 10:30-10:45 **Coffee Break (Garden Court)**

10:45-12:30	Session 2: Skeletal Biology and Dental Anthropology Chair: Dr. Jerry Cybulski, Canadian Museum of Civilization
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- 10:45-11:00 Spigelski, Sheryl Anne, Topic, John, Topic, Theresa, Nelson, Andrew. Human Sacrifice: A Bioarchaeological Corroboration.
- 11:00-11:15 Fitzgerald, Charles, Saunders, Shelley R., Skinner, Mark. Formation of Localized Hypoplasia of the Primary Canine.

- 11:15-11:30 Cormack, Julie. From which Point to which Point? The Question of Tibial Measurements.
- 11:30-11:45 Marciniak, Stephanie. A Test of Osteometric Sorting of Commingled Human Remains.
- 11:45-12:00 Moore, Collin. Age Estimation from Dental Histology on a Sub-sample from Apollonia Pontica.
- 12:00-12:15 Toth, Ferenc and Liston, Maria. Bone, Fire and Ice: The Effect of Experimental Water Freezing on the Fragment Size of Cremated Bone.
- 12:15-12:30 Swayze, Sarah and Skinner, Mark. Weaning and Linear Enamel Hypoplasia in Cave Bears (*Ursus spelaeus*).
- 12:30-1:30 **Lunch (Complimentary student lunch in the hotel)**

1:30-3:45	Session 2: Skeletal Biology and Dental Anthropology, continued Chair: Dr. Robert Hoppa, Dept. of Anthropology, University of Manitoba

- 1:30-1:45 Rainey, Dori. Cervical Spinous Process Morphological Variation in two Portuguese Skeletal Collections.
- 1:45-2:00 Kurki, Helen, Ginter, Jaime, and Pfeiffer, Susan. Ecogeographic Attributes of Small-bodied Direct Return Foragers from Southern Africa.
- 2:00-2:15 Lawrie, Christine. Is the FORDISC 3.0 a Useful Tool for the Sex Determination of the Medieval Population of Westerhus, Sweden?
- 2:15-2:30 Saunders, Shelley R., Chan, Andrea H.W., Kahlon, Bonnie, Kluge, Hagen F., FitzGerald, Charles M. Sexual Dimorphism of the Dental Tissues in Human Permanent Mandibular Canines and First Premolars.
- 2:30-2:45 Sharman, Jennifer. The Mysterious Rickley Remains.
- 2:45-3:00 Pritchard, Brian. Egyptian Identities: Application of Fordisc 2.0 to an Egyptian Burial Population.
- 3:00-3:15 Waters-Rist, Andrea, Bazaliiskii, Vladimir I., Weber, Andrzej, Goriunova, Olga I., Katzenberg, M. Anne. Dental Enamel Hypoplasia in Holocene Siberian Hunter-Gatherers: Evaluating Evidence for 'Weaning Stress' and 'Seasonal Stress'.

3:15-3:30 Barros, Anna and Mirjana Roksandic. Site Burial Reconstruction at Cabeco da Amoreira (Muge, Portugal).

3:30-3:45 Karcich, Grant. Molecular Anthropology of Great Lakes Middle and Late Woodland populations: Recent Developments.

collab w/ Bing. Grennam did analysis
3:45-4:00 **Coffee Break (Regency)**
AIPA 119: 84-86

4:00-6:00	Session #3: Palaeopathology Chair: Dr. Anne Keenleyside, Dept. of Anthropology, Trent University
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4:00-4:15 Boston, Christine. Arsenic and Mummification: An Exploration of the Connection Between the Causes of Mummification and Possible Arsenic Poisoning.

4:15-4:30 Garvie-Lok, Sandra. Signs of Scurvy in a Late Roman Child from Stymphalos, Greece.

4:30-4:45 Whitaker, Katie. Tuberculosis in the Past: Should Visceral Surface Rib Lesions be Added to the Diagnostic Criteria?

4:45-5:00 Gardner, Janet. Evidence for Interpersonal Violence Among Neandertals.

5:00-5:15 Maxwell, Jay, Chhem, Rethy, White, Christine D., Nelson, Andrew. A Radiological Critique of Scurvy Diagnoses in Bioarchaeological Samples.

5:15-5:30 Von Hunnius, Tanya, Yang, Dongya, Eng, Barry, Wayne, John S., Saunders, Shelley R. Digging Deeper into the Limits of Ancient DNA Research on Syphilis.

5:30-5:45 Gill-Robinson, Heather. Identification and interpretation of multiple fractures and inflicted trauma on an Iron Age peat bog body from northern Germany.

5:45-6:00 Gloux, Sabrina and Drapeau, Michelle. Handedness and Directional Asymmetry of Lower Limbs: Testing the Hypothesis of the Crossed Symmetry Pattern in Articular Dimensions

Friday October 27th, 2006

08:30-10:30	Session 4: Forensic Anthropology: Past, Present, and Future. Organizer and Chair: Dr. John Albanese, Dept. of Sociology and Anthropology, University of Windsor
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- 08:30-08:45 Albanese, John. Contributions of J.C.B. Grant to Anthropology.
- 08:45-09:00 Ginter, Jaime. Beyond the Bones: A Multifaceted Approach to the Study of an Unknown Skeletal Collection.
- 09:00-09:15 Cardoso, Hugo. A Same-sample Approach for Determining the Sex of Immature Skeletal Remains Using Permanent Tooth Measurements.
- 09:15-09:30 Yann, Heuzé. Are population-specific standards needed to improve quality in dental age estimation of subadults?
- 09:30-09:45 Tuck, Andrew and Albanese, John. A New Universal Method for Estimating Stature from Long Bone Length: But Professor, What 'Race' Is My Femur?
- 09:45-10:00 Eklics, Greg and Albanese, John. A Metric Method for Sex Determination using the Femur Neck: How to assess variation in the pubic bone when it is not recovered.
- 10:00-10:15 Kron, Hope. The CSI Effect: Its Causes and Legal Implications.
- 10:15-10:30 Merritt, Catherine. Winter Excavation on Trial.
- 10:30-10:45 **Coffee Break (Garden Court)**

10:45-12:15	Session 5: Collaborative Health Research in Aboriginal Communities Organizer and Chair: Dr. Marion Maar, Northern Ontario School of Medicine, Laurentian University
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- 10:45-11:00 Introductory Remarks: Marion Maar
- 11:00-11:15 Maniwabi, Lenore. Ethical Aboriginal Health Research: Can Culturally-based Aboriginal Values and Mainstream Research Ethics Come Together?
- 11:15-11:30 Varughese, Marie, Reid-Smith, Richard, Edge, Victoria, McEwen, Scott. Methodological Issues in Northern Aboriginal Community-based Health Research.

- 11:30-11:45 Maar, Marion. "What can we do to reverse this trend?" A Community-based Diabetes Care and Prevention Research Project in First Nations on Manitoulin Island.
- 11:45-12:00 Galloway, Tracey. Children's perceptions of school mealtime experiences: controlling children's bodies and behaviour through food rules and rewards.
- 12:00-12:15 Discussant Sylvia Abonyi
- 12:15-1:30 **Lunch**

1:30-3:15	Session 6: Bone Chemistry Chair: Dr. Jocelyn Williams, Dept. of Anthropology, Trent University
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- 1:30-1:45 White, Christine D., Longstaffe, Fred J., Price, Doug, Spence, Michael. The Moon and the Feathered Serpent: The Geographic Identities of Sacrifices at Teotihuacan's Great Pyramids.
- 1:45-2:00 Kwok, Cynthia, and Keenleyside, Anne. Feeding the Children: Isotopic Evidence for Weaning Practices in the Greek Colony of Apollonia (5th-2nd Centuries BC).
- 2:00-2:15 Brady, Allyson, White, Christine D., Longstaffe, Fred J., Southam, Gordon. Intra-bone Isotopic Variations in Bioapatite: Micromilling versus IR-laser Ablation.
- 2:15-2:30 Olsen, Karyn C., White, Christine D., Longstaffe, Fred J. Exploring the Origins of Human Sacrificial Victims at Iximche, Guatemala Using Oxygen Isotope Analysis.
- 2:30-2:45 Prowse, Tracy. Isotopic Evidence for Diet in the Vagnari Skeletal Sample (2nd - 4th c. AD)
- 2:45-3:00 Paterson, Catherine. Stable Isotope Analysis and Geographic Origins of 19th Century Port Hope Pioneers.
- 3:00-3:15 Dolphin, Alexis and Goodman, Alan H. Zn/Ca Ratios in Infants' Teeth Vary According to Maternal Nutritional Status and Weight Gain During Pregnancy.
- 3:15-3:30 **Coffee Break (Garden Court)**

3:30-5:00	Session 7: Variations on a Theme: 3D Visualization in Biological Anthropology Organizer and Chair: Dr. Richard Lazenby, Anthropology Program, University of Northern British Columbia
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- 3:30-3:45 Introductory Remarks: Richard Lazenby
- 3:45-4:00 Tocheri, Matt and Marzke, Mary. 3D Riddles of the Radial Wrist: Derived Carpal Morphologies in the Genus *HOMO* and the Implications for Understanding the Evolution of Stone Tool Behaviors in Hominins.
- 4:00-4:15 Ryan, Timothy M., Walker, Alan, Spoor, Fred, Garland Jr. Ted, Krovitz, Gail, Silcox, Mary T. Three-dimensional imaging and quantification of the semi-circular canal system in primates.
- 4:15-4:30 Milner, George R., Ryan, Timothy M. Three-dimensional visualization and analysis of a prehistoric arrow injury using high-resolution computed tomography.
- 4:30-4:45 Parsons, Trish, Kristensen, Erika, Boyd, Steven K., and Hallgrímsson, Benedikt. A Novel High-throughput 3D Morphometric Method for Mean Shape Visualization and Comparison.
- 4:45-5:00 Lazenby, Richard A., Cooper, David M.L., Angus, Sarah, and Hallgrímsson, Benedikt. A Tale of Heads: 3D Trabecular Microarchitecture in Paired Second Metacarpals as a Test of the Articular Constraint Model.
- 5:00 **Business Meeting (Saffron North)**

Saturday October 28th, 2006

09:00-12:15	Session 8: Primatology Chair: Dr. Ian Colquhoun, Dept. of Anthropology, University of Western Ontario.
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- 09:00-09:15 Wikberg Eva and Sicotte, P. A Pilot Study of Social Relationships, Relatedness and Dispersal Patterns of Female Ursine Colobus (*Colobus vellerosus*).
- 09:15-09:30 Bryce, Erin, and Sawchuk, Larry. Monkeys and the Empire: A Wartime History of the Barbary Apes of Gibraltar.
- 09:30-09:45 Beaudoin, Claudiane and Chapais, Bernard. Special

Relationships between Males and Females in a Captive Long-tailed Macaque (*Macaca fascicularis*) Group.

- 09:45-10:00 Reid, Michael J.C., Ursic, Raul J., Cooper, Dawn M., Nazzari, Hamed, Griffiths, Melinda, Garriga, Rosa M., Galdikas, Birute M.F., Skinner, Mark F., Lowenberger, Carl A. The Plasmodia of Southeast Asian Primates Reconsidered.
- 10:00-10:15 Colquhoun, Ian. Evolution of Sexual Dichromatism in the Genus *Eulemur*: The Possible Role of Apostatic Selection.
- 10:15-10:30 Sendall, Courtney, Fernandez-Duque, Eduardo, Di Fiore, Anthony. A Brief Investigation into the Maintenance of Proximity During Estrous by Titi Monkeys (*Callicebus discolor*).
- 10:30-10:45 **Coffee Break (Garden Court)**
- 10:45-11:00 Campos, Fernando, Manson, J.H., and Perry, S. Urine Washing and Sniffing in Wild White-faced Capuchins (*Cebus capucinus*): Testing Functional Hypotheses.
- 11:00-11:15 Valenta, Kim and Fedigan, Linda M. Seed Dispersal by White-Faced Capuchins (*Cebus capucinus*): Evaluating Quality.
- 11:15-11:30 Melin, Amanda, Fedigan, Linda, Hiramatsu, Chihiro, Kawamura, Shoji. Diet, Foraging and Colour Vision: Evaluating the Niche-divergence Hypothesis as an Explanatory Mechanism of Polymorphic Colour Vision in White-faced Capuchins (*Cebus capucinus*).
- 11:30-11:45 Steffens, Travis, Pavelka, Mary, McGoogan, Keriann. Black howler (*Alouatta pigra*) population size and characteristics before and after a major hurricane.
- 11:45-12:00 Snarr, Kymberley. Patch Occupancy Modeling: Distribution and Abundance of Honduran Primates in Cusuco National Park, Honduras.
- 12:00-12:15 Schillaci, Michael. Sexual Selection and the Evolution of Brain Size in Primates.
- 12:15-12:30 Concluding Remarks

POSTERS

Social Determinants of Childhood Overweight and Obesity in School District 57, Prince George, British Columbia. Sarah Angus, Richard Lazenby, Hanh Huynh, Zhenguo Qiu, Mary Jago, Diana Tallman, Gilat Grunau, Anthropology and Northern Medical Programs, University of Northern British Columbia, Prince George, BC.

Investigating Palaeodiet Using Multiple Tissues from Ancient Peruvian Mummies. Jocelyn Williams, Dept. of Anthropology, Trent University.

Mineral Yield as an Indicator of Bone Quality for Carbonate Analyses. Tamara Varney, Dept. of Anthropology, Lakehead University, and Sandra Garvie-Lok, Dept. of Anthropology, University of Alberta.

Experiments in Ochre Staining on Bone. Jaimie McIntyre and Mirjana Roksandic, University of Toronto.

Reconstructing Burial Position on Skeletal Material from Cabeco da Amoreira. Emily Rondel, Amy Widdifield, and Mirjana Roksandic, University of Toronto.

Hand Manipulation Skills in a One-Arm Gibbon. Jacqueline Prime, Department of Anthropology, Southern Illinois University, Carbondale.

The SSHRC Strategic Clusters Program: Children and Childhood in Human Societies. Shelley R. Saunders. Dept. of Anthropology, McMaster University.

CAPA 2006 Abstracts

Towards a Northern Saskatchewan Strategy for Handling the Emergence of HIV/AIDS and Hepatitis C: An Exploration of Perception, Experience, and Response Capacity in Four Aboriginal Communities

Sylvia Abonyi, University of Saskatchewan

Canada's Aboriginal people are disproportionately becoming infected with HIV and AIDS. Population health determinants such as poverty, lower education levels, poor housing, and a colonial legacy that included residential schools, have resulted in more HIV-vulnerable activities, such as higher intravenous drug use, among Aboriginal people. Community leaders in northern Saskatchewan linked the presence of these conditions with the potential for HIV and AIDS to emerge as significant issues in their communities several years ago. This paper reports the results of a community based research project aimed at creating a northern Saskatchewan HIV/AIDS prevention, education, and support strategy. The major objective of this research project was to collect baseline information on northern peoples' perceptions and experiences of HIV/AIDS, as well as to identify local and regional capacities and gaps for preventing and managing HIV/AIDS. As the project got underway, a better understanding of the context of hepatitis C was also included in the research objectives since it comes to communities in many of the same ways as HIV and AIDS, and because it was already a concern in northern Saskatchewan. Research activities took place in two Métis and two First Nations communities between October 2002 and September 2005. A 10-member project Steering Committee designed interview and focus group discussion questions in a collaborative exercise that built on questions asked in similar projects elsewhere. One community member from each of the four participating communities was hired as a research assistant to conduct interviews and group discussions in their home community. Over 200 individuals participated. The analysis considered themes identified in a literature review, as well as new themes that emerged in the interviews and focus group discussions. Major theme areas include fear of HIV/AIDS, knowledge about hepatitis C, misconceptions, levels and contingencies of support, issues of confidentiality, and community location in time, space, and jurisdiction. These will be briefly discussed in the presentation, with reference to their influence on the project Steering Committee recommendations for a northern Saskatchewan approach to HIV/AIDS and hepatitis C.

Contributions of J.C.B. Grant to Anthropology

John Albanese, University of Windsor

Dr. John Charles Boileau Grant is best known for his outstanding contributions to the instruction of anatomy. Grant taught anatomy to thousands of medical students at the University of Manitoba, University of Toronto and at UCLA. After his appointment to the chair of anatomy at the U. of T. in 1930, he greatly expanded the museum of anatomy that is still a resource for medical students. He authored three influential texts that were published in multiple editions including his *Atlas of Anatomy*, which is currently in its eleventh edition. The focus of this paper is on Grant's less well known but equally important influence on physical anthropology in Canada. Grant did not publish extensively in the area of physical anthropology (only three publications, all before WW II). However, over 30 years after his death, he continues to have a great influence on the discipline in several significant ways. He is clearly the "Great Grandfather" of osteology in Canada. His interest

in osteology and prominence made him, in practice, a forensic anthropologist long before this specialization existed as a discipline. Although he rarely found time to conduct anthropological research, he inspired others to pursue such research and instruction. Almost all the skeletal biologists holding tenured positions in Canada, including the author, can trace their academic lineage directly or indirectly to Grant's student James E. Anderson. In the mid 1960s, Anderson, along with Lawrence Oschinsky, established at the U. of T. what at the time was the only avenue in Canada to pursue graduate research in physical anthropology. Additionally, the skeletal reference collection amassed under Grant's direction at the U of T has been and continues to be an invaluable resource for training graduate students and an important source of data for forensic and palaeopathological research. The Grant collection is discussed in detail in the historical context of similar reference collections such as the Terry and Hamann-Todd Collections. Site burial reconstruction at Cabeco da Amoreira (Muge, Portugal)

Social Determinants of Childhood Overweight and Obesity in School District 57, Prince George, British Columbia

Sarah Angus, Richard Lazenby, Tracey Galloway, Hanh Huynh, Zhenguo Qiu, Mary Jago, Diana Tallman, Gilat Grunau

Anthropology and Northern Medical Programs, University of Northern British Columbia, Prince George, BC

Overweight and obesity (OW-OB) is recognized as a serious health problem of pandemic proportions (WHO, 2006). The degree of OW-OB among subadults is less appreciated than that for adults, although its relationship to negative health outcomes in later life (e.g., type II diabetes, CVD, hypertension and stroke) is well established. We report here preliminary results from a pilot study examining OW-OB in 283 children (grades 1 – 6) from 4 elementary schools in Prince George, British Columbia. These schools represent 4 distinct catchments as per the 2001 Canadian census dissemination area profiles. Means from triplicate measures for height (m), weight (kg), waist and hip circumference (cm) are translated as body mass index (BMI, kg m^{-2}) and the waist-hip ratio (WHR), and contrasted against established standards (CCHS, 2004; CDC, 2000). Outcomes are evaluated using a 'social determinants' of health model incorporating 2001 census data for average family income, income composition, proximity to LICO, attained education (% post-secondary), single parent household incidence, and ethnicity (aboriginal versus other). Results indicate that: (1) significant differences exist among the 4 catchments with respect to social determinants; (2) prevalence of OW children in 2 of 4 catchments exceeds Canadian age- and sex-matched standards while OB rates match national standards with the exception of the lowest SES catchment for which OB is almost 2x higher; (3) OW-OB rates tend to be greater in lower SES catchments, among aboriginal versus non-aboriginal children, and among younger (< 9 yrs of age) versus older children. In conclusion, the results of this study are important in that they demonstrate that the trend to OW-OB transcends a simple social determinants analysis. Children across all social strata in Prince George are progressing towards overweight and obesity, although the trend is more marked among the relatively disadvantaged. Future analyses will need to incorporate specific data for diet and activity, as both are known to have a significant impact on body mass (Shields, 2004).

Site Burial Reconstruction at Cabeco da Amoreira (Muge, Portugal)

Anna Barros and Mirjana Roksandic, University of Toronto

The Mesolithic shell middens in the Muge valley have a long history of excavation. This has caused substantial problems in curation and inventory of burials found at these sites. The purpose of our research is to reconstruct the postexcavational history of the burials, and to the extent possible, associate different individuals with existing documentation. We will focus on the skeletal material from the Mesolithic site of Cabeço da Amoreira (Muge, Portugal) excavated in 1962/63 by Veiga Ferreira and Roche, currently housed at the Museu Geologico in Lisbon. Our methodological approach is based on detailed analysis of skeletal elements and their anatomical associations, and their comparison with the transcriptions of the original documentation from the field journals from the 1960s published by J. Cardoso and J. Rolao in 2003 including photos, drawings and descriptions. The aim of our reconstruction of site excavations and curation in the museum is to match the burials to their documentation as a starting platform for building a better understanding of the Mesolithic in the Muge valley.

Special Relationships Between Males and Females in a Captive Long-tailed Macaque (*Macaca fascicularis*) Group

Claudiane Beaudoin and Bernard Chapais, Université de Montreal

Anoestrus females, particularly in baboons, often maintain close associations with particular males. These associations have also been observed in other species including rhesus and Japanese macaques, some lemurs and even chimpanzees. The long-tailed macaque has never been the subject of such a research. The benefits obtained through a special relationship are somewhat obscure and the literature shows inconsistencies on the recipient and the nature of the benefits. Furthermore, research on friendships has always been made through the female's eye; here we try to understand this phenomenon from the male's point of view. The primary aim of this project was to determine whether special relationships or friendships exist between male and female long-tailed macaques (*Macaca fascicularis*). Our secondary aim was to see who gained the most benefits out of these relationships and of what nature these benefits were. Our study was conducted on a captive group situated in the Laboratoire de primatologie comportementale de l'Université de Montréal. The study group contained two adult males, 14 adult females and two sub-adult females. We determined the quality of the relationships between the two males of the group and the females using grooming and proximity data. Relationships were found in which males and females were persistently close to one another in non-sexual contexts, and we were able to establish that there were differences in intensities between special relationships and friendships. What's more, the two males presented relationships with different females. We observed that the older male, who was also subordinate to the other male, had sexual gains regarding his special relations and friends. The younger and dominant male, on the other hand was less aggressive with his special relations and friends. The older male was also more responsible for the proximity with all the females than the other male, showing a more acute interest. These results are interesting because they show that the benefits received depend on individual behaviours. Also it is visible that males, in addition to females, have interests in and benefit from these relationships.

Arsenic and Mummification: An Exploration of the Connection Between the Causes of Mummification and Possible Arsenic Poisoning

Christine Boston, University of Western Ontario

In November 2005, Bernardo Arriaza presented his hypothesis that the world's first and oldest artificial mummification practices were a cultural response to naturally occurring inorganic arsenic.

The Chinchorro populations of northern Chile and southern Peru were an archaic, preceramic culture that produced the world's oldest mummies, but the origins of these practices are still unknown. Arriaza cited previous studies of arsenic related pathological conditions in later populations of the region and modern evidence of high arsenic levels in the drinking water as the possible catalyst for the artificial mummification practices of the Chinchorro.

In the summer of 2006, a paleopathological and growth and development study was undertaken to test this new hypothesis. The study was to examine the skeletal remains of the Chinchorro and later peoples to see if there was indeed osteological evidence to support Arriaza's arsenic hypothesis and see if the populations had, over time developed a tolerance to the arsenic in their environment.

Approximately 196 individuals were analyzed for this study from the Chinchorro, as well as the later Faldas del Morro, Quiani, Gentilar, and Inca time periods (all from the same geographic region).

This presentation will discuss the results of the (possibly) arsenic related paleopathological lesions of this study. Arsenic related lesions according to the medical literature include cleft palate, cleft lip, polydactylism, syndactylism, clubfoot, spina bifida, eye malformation, hip joint dislocation, skin malformations, and other congenital malformations. Of the 196 individuals in the sample, 14% exhibit at least one arsenic related lesion and another 14% may exhibit lesions possibly related to arsenic. These results lend credence to Arriaza's hypothesis, and should lead to a renewed interest in the physical anthropology of Chile's ancient populations. The objective of this study is to further explore this hypothesis using multiple lines of evidence, including growth and development of these populations. This project also has applications for modern studies of arsenic as it provides a temporal study of arsenic in the past. As this project is still a work in progress any feedback or suggestions are welcomed by the presenter.

Intra-bone Isotopic Variations in Bioapatite: Micromilling versus IR-laser Ablation

Brady, Allyson L.¹, White, Christine D.², Longstaffe, Fred J.³, and Gordon Southam³

¹School of Geography and Earth Sciences, McMaster University

²Department of Anthropology, The University of Western Ontario

³Department of Earth Sciences, The University of Western Ontario

The development of microsampling techniques is among recent advances in isotope technology. The potential of *in situ* microsampling (micromilling and IR-laser ablation) for detection of intra-sample isotopic variation arising from diagenesis and/or natural remodeling of bone was examined in this study. While studies using such techniques have been described for enamel, detailed testing of these microsampling methodologies has not been reported for bone.

The $\delta^{13}\text{C}$ and/or $\delta^{18}\text{O}$ values of bioapatite were determined for modern sheep bone exposed to microbial populations, and for diagenetically modified archaeological bone. No significant differences were found between the $\delta^{13}\text{C}_{\text{laser}}$ or $\delta^{18}\text{O}_{\text{laser}}$ values of microbially colonized and uncolonized areas of the modern bone surfaces, or between well-preserved and poorly preserved regions of the archaeological material. The $\delta^{13}\text{C}$ values of structural carbonate obtained using IR-laser ablation were lower than those acquired by conventional analysis. The presence of organic matter could account for the difference, but attempts to remove it from whole bone samples using the conventional method (bleach) did not significantly change the results.

Intra-sample variability in δ -values of bone bioapatite obtained using IR-laser ablation was very high, and can be mainly attributed to methodological limitations. There was less variability in the isotopic compositions of micromilled samples of structural carbonate from bone bioapatite. Differences in the $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ values of different bone surfaces may indicate variations in the isotopic compositions of food and water incorporated into osteons over a lifetime, and illustrate the relationship between bone remodelling and isotopic heterogeneity in bone. Consequently, isotopic results obtained via microsampling can vary significantly from those produced for conventional (bulk) samples.

Monkeys and the Empire: A Wartime History of the Barbary Apes of Gibraltar

Erin Bryce and L. Sawchuk, University of Toronto

The Barbary macaques of Gibraltar have been a source of study and contemplation dating back to the 19th century and beyond. By the time of WWII, the Barbary apes had become an entrenched cultural symbol of the strength of the British Empire. Although most people are familiar with the legend that Britain will lose the Rock should the macaques leave, the actual events surrounding the monkeys have been forgotten. The fate of the troop was threatened when, in 1942, over half of an already dwindling population died, bringing their numbers down to just eight individuals. Due to their tremendous cultural significance, the fate of the macaques was a sensitive issue, and even attracted the attention of the British Prime Minister. Several theories regarding the loss of the monkeys were discussed at the time, including an improperly managed sex ratio, inbreeding, noise from the War, the diminution of territorial boundaries due to the War effort, exposure to harsh climatic conditions, and even sabotage from Hitler and the German troops. We will discuss the likelihood of these theories, using historical correspondence as well as demographic and climatic records. We will also discuss the measures that have been taken to maintain the population since WWII, and, to the extent that climate played a role in the demise of the troop, the probability that climatic changes will again threaten the health of these historic primates. This presentation highlights the importance of understanding the demographic history of a managed population, since it sheds light on the population's contemporary status.

Urine Washing and Sniffing in Wild White-faced Capuchins (*Cebus capucinus*): Testing Functional Hypotheses

Fernando Campos¹, J. H. Manson^{2,3,4} and S. Perry^{2,3,4}

¹Department of Anthropology, University of Calgary

²Department of Anthropology, University of California, Los Angeles, USA

³Center for Behavior, Evolution and Culture, University of California, Los Angeles, USA

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Urine washing (UW) is a stereotyped behavioral sequence that consists of urinating onto the hand and rubbing the urine on the surfaces of the hands, feet, and tail. Although taxonomically widespread among strepsirrhines and platyrrhines, the functional significance of UW remains unclear. White-faced capuchins (*Cebus capucinus*) engage regularly in UW and possess no specialized scent-producing glands or visual cues of ovulation, raising the possibility that urine might be used for communicating reproductive status or other socially relevant information in this species. We used 2274 hr of focal follows of 35 adult and subadult wild white-faced capuchins to test (a) the inter-group signaling, intra-group social signaling, and thermoregulatory hypotheses for UW and (b) the hypothesis that individuals sniff each other's urine and other traces to gather socially significant information. Males engaged in significantly more UW than females (Mann-Whitney, $p < 0.004$). All five alpha

males engaged in more UW than subordinate males (Mann-Whitney, $p < .001$), including four alpha males who increased their UW rate following their rise to alpha rank. Males engaged in significantly less UW while in view of other males than at other times (Sign test, $p < .001$). UW rates did not increase while subjects were in parts of their home range where more inter-group encounters occurred. UW rates were highest in the morning and late afternoon, presumably when temperatures were coolest. Males did not preferentially sniff the traces of cycling females, and male-male sniffing rates were not correlated with either aggression rate or dominance rank distance. These data do not provide clear support for either the thermoregulatory or social signaling hypotheses. We suggest that additional studies in the wild and experiments with captive capuchins may be necessary to determine function of UW in this taxon.

A Same-sample Approach for Determining the Sex of Immature Skeletal Remains Using Permanent Tooth Measurements

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Inability to determinate the sex of immature remains represents one important limitation to forensic anthropology and bioarchaeological research. Various morphological and metric methods have been proposed but they have failed to reach significant accuracy in cross-sample comparisons, only around 60% to 70% correct classification at best. The problem of sample specificity is related to variations in size and patterns of sexual dimorphism between populations that result from differing living conditions and activity patterns, and in some cases genetic variation. Therefore, if sample-specific methods can be developed, several sources of bias can be controlled for. In this paper, I will present a same sample approach to estimate the sex of immature remains using permanent tooth size. An adult sample (>20 years of age; $n=96$) from the Lisbon documented skeletal collection was selected and mesio-distal and bucco-lingual diameters were taken on permanent mandibular teeth. Logistic regression was used to develop several sex determination formulae based on combinations of measurements from different teeth. The various formulae were tested on a subadult sample (<15 years of age, $n=46$) of the same collection and accuracy ranged from around 70 to slightly over 80%. Although this approach does not provide significantly better performances than other metric or morphological methods, it does provide control over variation that other methods do not control for and by using logistic regression it provides the probability of each individual belonging to each sex. Because this approach requires a large sample of adults, it is mostly applicable in forensic mass grave cases and bioarchaeological studies, where one can develop dental equations using the best preserved adults skeletons, where sex has been determined using standard morphological methods (such as the ones based on the pelvis) and then apply these equations to determine the sex of the subadult skeletons of the same sample.

Evolution of Sexual Dichromatism in the Genus Eulemur: The Possible Role of Apostatic Selection

Ian Colquhoun, The University of Western Ontario

A distinctive characteristic exhibited by all species and subspecies of the lemurid genus *Eulemur* is their sexual dichromatism. This genus-wide intraspecific colouration difference by sex is also of note because across the 350+ species of the Order Primates, sexual dichromatism is relatively rare. Therefore, this "taxonomic clustering" of sexual dichromatism in one genus deserves further consideration. Previous research has suggested that sexual selection (with females preferring as mates males that are more contrasting to themselves in colouration) could explain the evolution of *Eulemur* sexual dichromatism.

But, the strict seasonal breeding of lemuroids undercuts this explanation. An explanation for sexual dichromatism that applies widely across Metazoan species, but has been overlooked in regards to *Eulemur* until now, is apostatic selection -- i.e., predators preying on the most commonly encountered prey species. In this paper I propose that under Madagascar's unique biogeography, where lemurs dominate the mammalian fauna and are prey for many predators, *Eulemur* sexual dichromatism may represent a polymorphic adaptation to apostatic selection. Sexual dichromatism would produce the selective advantage to *Eulemur* species of predator confusion through polymorphism, while apostatic selection would represent a selective force that operates year-round and one that would be complementary to breeding season sexual selection.

From which Point to which Point? The Question of Tibial Measurements

Julie Cormack, Mount Royal College

The Broca osteometric board was used traditionally to measure maximum lengths of the six adult human long bones: femur, tibia, fibula, humerus, radius, and ulna.

Comparisons of length measurement descriptions from various published sources of five of these six bones indicate relatively consistent techniques. The exception is the tibia. A special feature of the Broca board was an opening in the vertical endplate to accommodate the intercondylar eminences of this bone. Today, this opening is rarely found in osteometric boards, and different instrument designs have allowed for greater measurement application such as: measuring epicondylar and epiphyseal breadths, and dimensions of the sternum, os coxae, calcaneus, talus, metatarsals and phalanges, clavicle, and scapula.

In winter 2005, a team of engineering students from Mount Royal College designed and built an osteometric board. Part of this project was to consider the challenges of accommodating various length measurement techniques described for the tibia. Recently, comparative results by Raxter et al. (2006) indicate a significant statistical difference in the maximum length measurement of this long bone using variously designed osteometric boards. The purpose of this paper is to present some concerns of tibial length measurements.

Zn/Ca Ratios in Infants' Teeth Vary According to Maternal Nutritional Status and Weight Gain during Pregnancy

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There has been considerable debate regarding the validity of paleodietary reconstructions based upon analyses of essential trace elements such as zinc. Because zinc

does not undergo a clear trophic level separation, as its uptake by hard tissues is complicated by local variables affecting bioavailability, some have argued that Zn values in tooth and bone cannot be reliably interpreted. However, with an understanding of the nature of Zn metabolism and the factors affecting its bioavailability during tissue formation it may yet be possible to utilize measures of hard tissue Zn concentrations in evaluating the nutrition and health of past populations.

Pre- and postnatal enamel Zn levels were determined via laser ablation-inductively coupled plasma- mass spectrometry (LA-ICP-MS) for 80 teeth collected from 46 infants participating in a large longitudinal study in the Solís Valley, Mexico, during the mid-1980s.

Relationships between enamel Zn levels and variables documenting maternal diets, infant growth, morbidity and cognitive development were explored.

The results indicate a statistically significant inverse relationship between the prenatal enamel Zn content of Solís infants and their mother's pregnancy dietary quality.

Prenatal enamel Zn levels were also inversely correlated with infants' later cognitive development. Further, postnatal enamel zinc appears to be negatively influenced by maternal weight gain during pregnancy. These results suggest that, while the Zn content of dental enamel may not be useful in reconstructing the relative quantity of food groups contributing to paleodiets, it can provide insights regarding paleonutritional quality and potentials for functional impairment later in life.

SSHRC Doctoral Fellowship #752-2000-1192; NIH #R15 DE09863; NSF CRUI Project DBI 9978793

A Metric Method for Sex Determination Using the Femur Neck: How to Assess Variation in the Pubic Bone When it is not Recovered

Greg Eklics and John Albanese, University of Windsor

For a long time, the general consensus was that metric approaches for sex determination are population specific while visual methods are more widely applicable. Several publications in recent years clearly indicated that both assumptions are not true. Visual methods (for example, the Phenice method) are not widely applicable (MacLaughlin and Bruce 1990) while metric methods can be designed to be universally applicable (Albanese 2003). The pelvis, more specifically the pubic bone, is the best source of information for determining sex from skeletal remains. Unfortunately, the pubic bone is susceptible to damage in archeological and forensic cases. In the past, this dilemma has led to the development of non-pelvic methods for sex determination, which are used when data from the pelvis is not available. We approached this problem from a different perspective and asked the question: How can we assess variation in the pubic bone when it is not recovered or cannot be analyzed? Differential growth of the symphyseal end of pubic bone in females is responsible for much of the sexual dimorphism in this bone, including the Phenice indicators and the length of the os pubis. Additionally, because of the mechanics of bipedal locomotion, the angle of the neck of femur is directly related to length of the pubic bone. In this paper, we present a method that is applicable in both archeological and forensic contexts for capturing and using the variation in the neck of the femur to determine sex. The allocation accuracy is greater than 90% when the method is tested on a diverse independent sample. This high accuracy is possible because although we use data only from the femur, the method is actually assessing variation in two highly sexually dimorphic areas of the skeleton: the pubic bone and the joints of a long bone.

Decline and Death at York Factory, 1880-1920

Tracy Farmer, McMaster University

Ethnographic information reveals that the declining economic situation at York Factory, one of the first Hudson Bay Company (HBC) fur trade posts established in North America, played an integral role in the changing patterns of health experienced by the Cree engaged in the trapping and trading of furs. Involvement in the fur trade meant that the livelihood and consequently the health and well-being of Aboriginal families was inextricably linked to the fluctuating demand for furs on the world market. An analysis of Anglican Church of Canada death records from 1880 to 1920 shows that infectious disease accounts for more than half of the mortality at York Factory. Specifically, respiratory infections such as bronchitis/pneumonia, influenza and tuberculosis were found to be the primary causes of death. Inadequate nutrition and sub-standard living conditions, brought on by poor socio-economic circumstances, were found to be contributing factors in the mortality of Aboriginal people living in this community. The loss of traditional Cree mobility and subsistence patterns, brought about by the fur trade, and increased reliance on European food and technology, left these individuals in a precarious position as the demand for furs declined.

Formation of Localized Hypoplasia of the Primary Canine

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A commonly observed enamel defect in deciduous teeth is a flat-bottomed pit on the mid-labial surface of primary canine crowns termed localized hypoplasia of the primary canine (LHPC). Although poorly understood, their aetiology has been claimed to be distinct from linear enamel hypoplasia (LEH). For some time we have been interested in trying to better understand the biological mechanism underlying LHPC formation, and we are now certain that it does not represent a wholly different phenomenon with its own separate aetiology. We believe that it is a member of the larger family of hypoplastic surface defects (LEH), part of a subgroup known as pit form defects. Internally, at least one Wilson band is always seen to be associated with the initiation of an LHPC defect (i.e. in the floor of the pit), as it is with other pit form defects and other types of LEH. This means that the underlying mechanism that produces LHPC is similar, and internally identical to that which produces other types of LEH as well as the neonatal line and striae of Retzius. We believe that these features are all produced by a systemic disruption to enamel formation; what differentiates one from another is the nature of the stress trigger that disturbs matrix secretion.

This paper presents the early results of a histological study of LHPC carried out on teeth from one European and several New World populations. Our sample includes dentitions that have at least one canine with LHPC as well as other deciduous teeth that were developing coevally, but which show no evidence of any form of LEH. The surfaces of all teeth have been studied with a stereo microscope and a scanning electron microscope. All teeth have also been thin sectioned and studied internally and the formation time of Wilson bands established using odontochronology. Our results indicate that the initiation of LHPC

occurs in early infancy, within the first six months of life. We still cannot identify their specific trigger, but we discuss alternative hypotheses.

Children's Perceptions of School Mealtime Experiences: Controlling Children's Bodies and Behaviour Through Food Rules and Rewards

Tracey Galloway, University of Northern British Columbia

This paper reports findings from a qualitative analysis of children's perceptions of the school nutrition environment. Focus groups were conducted with 144 schoolchildren (72 boys and 72 girls) ages 8-13 years. Open-ended questions were used to encourage students to describe the physical and social environments in which they consume school snacks and lunches. The results suggest that a wide range of rules and restrictions are imposed on children's activities during school meals. The majority of these rules govern the physical location, movement, and social interaction of students, suggesting a significant degree of institutionalized control over children's bodies and interactions. Few of the rules and restrictions were perceived by children to relate to their nutrition or health. And the imposition of these rules and restrictions occurs in a gendered fashion, creating a gendered climate in which school and societal stereotypes about boys and girls behaviour are normalized. In addition, food rewards constitute an important avenue for the communication of values and norms around food and children's behaviour. Educators and health workers need to be cognizant that school-based programs and policies aimed at decreasing childhood obesity prevalence occur in a wider context of institutional rules and practices that communicate their own powerful messages about food and children's bodies.

Evidence for Interpersonal Violence Among Neandertals

Janet Gardner, The University of Western Ontario

It has been noted that Neandertal life-ways were risky and injurious and, in particular, that Neandertals appear to have a high frequency of head and neck trauma. In a previous analysis of trauma patterns among Neandertals, Berger and Trinkaus argued that Neandertals were predisposed to animal assault injuries due to their close proximity hunting strategies. Further, they suggested that this pattern of Neandertal trauma is best explained as being indicative of "close encounters of the livestock kind." However, I will present results from recent research that demonstrate Neandertals have a trauma pattern that is significantly different than the trauma pattern that results from large animal assault on humans. In light of this, I propose alternative explanations for the pattern of trauma seen in Neandertals. A more discrete analysis of the types and locations of cranial trauma in Neandertals reveal patterns that are similar to those seen in populations that engaged in non-lethal interpersonal violence. In addition, accidental blows to the head (i.e. rockfalls) and falls are also considered as possible causes for traumatic injuries in Neandertals. The alternative explanations presented here provide us with new insights into Neandertal behaviour and what remains a relatively poorly understood social landscape.

Signs of Scurvy in a Late Roman Child from Stymphalos, Greece

Sandra Garvie-Lok, University of Alberta

In recent years, considerable attention has been given to a complex of skeletal lesions consisting of abnormal porosity in characteristic locations including the greater wing of the sphenoid, the temporal surface of the zygomatic, the posterior surface of the maxilla, the

area around the infraorbital foramen and the orbital roof. This complex has been described in a number of archaeological populations and is argued by several researchers to be diagnostic of juvenile scurvy. This paper presents a possible case of juvenile scurvy from the Late Roman burial population of Stymphalos, Greece. This juvenile, likely aged 24 to 30 months at death, shows porous lesions consistent with scurvy in combination with root caries in four teeth. Root caries are unusual in such a young child; consultation of the clinical literature suggests that while gum involvement is not often discussed as an aspect of juvenile scurvy, it can occur and is a possible explanation for the root caries in this juvenile. The case is discussed in terms of its wider implications for childrearing practices in Late Roman Greece and for the diagnosis of scurvy from archaeological skeletal remains.

Identification and Interpretation of Multiple Fractures and Inflicted Trauma on an Iron Age Peat Bog Body from Northern Germany

Heather Gill-Robinson, Department of Sociology and Anthropology, North Dakota State University

In 1959, the headless torso of an adult male from the Iron Age was discovered and excavated from a peat bog in northern Germany. The body displayed evidence of fractures to the left humerus, right clavicle, right femur, left fibula, right tibia and right fibula. Deep stab wounds were observed on the thorax, the anus displayed evidence of cutmarks and the penis had been excised. Through physical examination, image analysis and three-dimensional reconstruction, a re-evaluation of the fractures and trauma was undertaken. Although all fractures had originally been interpreted as perimortem, the re-examination indicated that several fractures were, in fact, taphonomic. The stab wounds, anal cuts and penis excision were deliberate and clearly perimortem. It is not possible to determine the definitive sequence of events, but it is clear that the man had been subjected to violence that led to his death. Cause of death can be attributed to one of three events: decapitation, a stab wound that penetrated the heart or exsanguination from the excision of the penis; it is likely that all events occurred nearly simultaneously and contributed to death.

Beyond the Bones: A Multifaceted Approach to the Study of an Unknown Skeletal Collection

Jaime Ginter, University of Toronto

In 1999 the Independent Order of Odd Fellows (IOOF) of Ontario donated a collection of skeletal remains from its defunct Ontario lodges to the Department of Anthropology at the University of Western Ontario. Very little was known about these remains, aside from the knowledge that they were used by the IOOF lodges in their initiation ceremonies. A forensic and socio-historic analysis was conducted in an attempt to investigate the origin of the remains and ascertain how they were obtained. Age, sex, health, and ancestry were assessed for each individual in order to create a demographic profile for the collection. Various sources of information were consulted, including Anatomy Acts, newspaper articles, archival documents, historical accounts of early Canadian medical practice, and North American cadaveral skeletal collections, in order to identify the sources of human skeletal remains and their uses during the late nineteenth century. Issues relating to the procurement of human cadavers, the practice of dissection and the study of human anatomy during the 19th century were also explored. The multiple lines of evidence employed in this analysis indicate that the most of the individuals in the Odd

Fellows skeletal collection were members of disadvantaged segments of society commonly exploited for dissection and the study of anatomy during the late nineteenth and early twentieth centuries. The demographic profile of this collection, as well as the presence of direct evidence of dissection, supports a connection to early medical training.

Handedness and Directional Asymmetry of Lower Limbs: Testing the Hypothesis of the Crossed Symmetry Pattern in Articular Dimensions

Sabrina Gloux and Michelle Drapeau, Université de Montréal

Joint form is frequently used to interpret locomotor and manipulative adaptations and infer physical behavioural patterns in past human populations. Directional bilateral asymmetry in human gross skeletal morphology is largely attributable to differential mechanical loading during growth. While much has been done in the way of identifying directional asymmetry in the diaphysis of the upper limb in relation to handedness and occupational variation, comparatively little research has focused on asymmetry in lower limb. The pattern of crossed symmetry, described as the combined contralateral asymmetries in upper and lower limbs, has been little studied and observed mostly in length and diaphyseal breadth. In most studies of the lower limb, the crossed symmetry pattern is taken as a premise but has rarely been directly investigated. This research proposes to investigate the hypothesis of a crossed symmetry pattern in humans, more particularly in bone lengths and articular surface dimensions. The sample consists of 86 non-pathological adult individuals from the osteological collections of the Canadian Museum of Civilization. The identification of bilateral asymmetries was first assessed using raw measurements, and only dimensions with significant bilateral asymmetries were kept for analysis. Percentages of Directional Asymmetry ($\%DA = [2 \cdot (D - G) / (D + G)] \cdot 100$) were calculated for each dimensions and used to test for crossed symmetry (Chi square). Results reveal that 50% of the measurements are significant for directional bilateral asymmetry, mostly for the upper limb as expected. For the lower limb, articular surface dimensions are more asymmetric than bone lengths. The vast majority of upper-limb measurements are consistent with a systematic right-bias, while only articular dimensions of the pelvic girdle and some of the foot bones indicate a systematic left-bias consistent with a crossed symmetry pattern. Only two sets of measures out of seven yielded significant results. However, these tests revealed same side asymmetry rather than crossed symmetry. Overall, this study does not support a pattern of cross symmetry in the population studied, but it still remains to be tested on various populations.

Are Population-specific Standards Needed to Improve Quality in Dental Age Estimation of Subadults?

Yann Heuzé, PACEA UMR 5199 LAPP, France

The purpose of this study was to reconsider the interest of the use of geographic-specific standards for the subadults dental age estimation thanks to orthopantomographs from 1,139 individuals (from 3.5 to 16.0 years) living in France. Regarding the fundamental effects of differing age distributions in training and test samples, two recent non-adult dental age estimation methods were used: a probabilistic method (Bayesian method with dependent assumptions) and polynomial functions. Radiographic stage assessment of the permanent teeth of the left-mandible was made according to the Demirjian's method. First, we focused on the meaning and the way to assess geographic origin. Since, results produced

thanks to our questionnaire were exposed: only 362 children out of 662 with efficient questionnaires had their four grand parents originate from France. Secondly, our results showed that the use of specific geographic standards did not systematically increase the quality of dental age assessments whatever the method used. The intra-population variability of dental maturation chronology appears equal or larger than the inter-population one. Even if these results have to be confirmed with younger samples and from different geographic-origin, they differ from findings published during the last decades. Nevertheless, recent studies support our results.

Molecular Anthropology of Great Lakes Middle and Late Woodland Populations: Recent Developments

Grant Karcich

A review of ancient mitochondrial DNA analysis of populations from Ontario including a review of other researchers in both U.S. and Canada. The oldest mitochondrial DNA sample found in the Great Lakes area and its implications for population identification will be presented.

The North/South Divide: Social Inequality and Mortality from the 1918 Influenza Pandemic in Hamilton, Ontario

Ellen E. Korol and D. Ann Herring, McMaster University

During the virulent autumn wave of the 1918 influenza pandemic, 418 people were recorded as having died from the disease in the City of Hamilton, Ontario. Using address information contained in the Hamilton death records housed at the Archives of Ontario, it was possible to plot 274 of these deaths onto a GIS street map of Hamilton. This map shows that deaths from influenza were scattered throughout the City. However, mortality rates by ward showed substantial variation, with wards in the less prosperous north end of the city experiencing higher influenza mortality rates than those in the more affluent south. In fact, the probability of a north end resident dying from influenza was twice as high as someone living in the south (Odds Ratio = 2.03, $p < .000$). Although it is often claimed that the 1918 influenza pandemic was a socially-neutral disease in which everyone was susceptible to the newly emerged H1N1 virus, our results suggest otherwise.

Supported by a McMaster University Faculty of Social Sciences Experiential Education Grant (Herring) and a University Student Research Assistant Award (Korol).

The CSI Effect: Its Causes and Legal Implications

Hope Kron, University of Western Ontario

In the last few years, television shows depicting various types and aspects of forensic investigations have become increasingly popular in mainstream media, ranging from programs that recount real cases and document the process of forensic investigation to fictional shows such as CSI, Bones, Crossing Jordan and many more. While some shows are educational and attempt to provide accurate information about forensic sciences and the legal system, fictional programs often present unrealistic and unattainable versions of the investigation process. Such misrepresentations often cause the public to have inaccurate views and expectations of forensic sciences, including forensic anthropology and archaeology, resulting in detrimental effects on the legal process. This phenomenon has been referred to as the CSI Effect and it has become an increasing concern for forensic experts. In this presentation, I will discuss the impact of mainstream media programs such as CSI on the legal

process of forensic investigations, specifically in the courtroom setting. I will begin by briefly outlining the role of forensic anthropology in the legal process and in the courtroom. Second, I will discuss some of the ways in which many popular forensic shows differ from reality, specifically in regards to forensic anthropology. I will then explain what effect this has on the legal process, providing some examples from recent years. And finally I will discuss ways in which the current situation can be improved and the negative impact of the CSI Effect can be minimized.

Ecogeographic Attributes of Small-bodied Direct Return Foragers from Southern Africa

Helen Kurki, Jaime Ginter, and Susan Pfeiffer, Department of Anthropology, University of Toronto

In the study of past human populations from skeletal remains, ecogeographic trends in body proportions are an important source of information about the biology, adaptation, and potential migratory history of a population. When estimating body size in skeletal samples, it is critical to match the body proportions of the study sample to the reference sample used to generate the many estimation formulae currently available. As such, the ecogeographic proportions of modern and past populations are an active area of study.

The archaeological skeletal sample of Later Stone Age (LSA) foragers from southern Africa have characteristically small skeletal dimensions and therefore represent unique body size attributes (e.g. body mass and stature). This small body size presents problems for accurate body size estimation since the majority of prediction equations are based on references samples of larger body size and different body proportions. When the Later Stone Age populations and their modern Khoesan descendents have been used in studies of ecogeographic patterning, they have generally been placed in low-latitude, warm-adapted, or sub-Saharan groups with other populations from Africa (except North Africa). However, throughout the Holocene, most Later Stone Age populations inhabited the South African coast at approximately 34° S, above the low-high latitude cut-off of 30°S/N. This coastal environment is typically more Mediterranean in character than tropical.

This paper assesses the use of the Later Stone Age sample in ecogeographic studies, and evaluates the reliability of the assumption that they represent a warm-adapted population. The comparison of body proportions based on skeletal remains suggest that this population presents unique body proportion attributes, with limb proportions (e.g. brachial and crural indices) falling near the indices of mid-latitude North Africa, but some features of body shape (e.g. bi-iliac breadth-femur length ratio) are similar to tropical African samples as well. This suggests that the Later Stone Age and Khoesan people are more characteristic of mid-latitude populations, than of specifically warm-adapted or tropical ones. Because of the paucity of known-stature reference samples from smaller-bodied and/or mid-latitude populations, accurate body size estimation in skeletal samples such as the Later Stone Age will continue to be problematic. Ongoing research is focusing on these issues.

Feeding the Children: Isotopic Evidence for Weaning Practices in the Greek Colony of Apollonia (5th-2nd Centuries BC)

Kwok, Cynthia and Anne Keenleyside, Trent University

Previous biochemical weaning studies in the Classical world have been confined to the Roman period, while ancient Greek weaning practices remain largely unexplored. This is the first study examining infant feeding practices in the ancient Greek colony of Apollonia

(5th-2nd centuries BC) on the Black Sea coast of Bulgaria using stable isotope analysis. Collagen from the ribs of 44 subadults, ranging in age from birth to 15 years are analyzed for stable nitrogen and carbon isotopes to determine the general age at which weaning was initiated and terminated, and the types of foods onto which infants were weaned. The subadult diet is also compared to that of the adults to investigate whether the children consumed a different type of diet than the adults of Apollonia. In addition, the stable isotopic data is integrated with the archaeological evidence and ancient literary sources to further ascertain infant feeding practices at Apollonia. Finally, the Apollonian weaning pattern is discussed within the context of other Classical biochemical weaning studies. Overall, this study shows the potential of incorporating evidence from multiple sources to draw a more complete picture of ancient Greek lifestyles and childrearing practices.

The Analysis of Candidate Genes and their Influence on Tuberculosis Susceptibility in a Canadian Aboriginal population: Some Preliminary Results

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Research is currently underway that takes a comprehensive and novel approach to investigating the high prevalence of *Mycobacterium tuberculosis* (MTB) in Manitoba's northern First Nations populations. The prevalence and severity of MTB varies between the thirty-three different Manitoba First Nations communities, as do the socioeconomic conditions, which may be increasing the risk of infection and disease transmission. Using laboratory-based molecular methods and community-based socio-cultural initiatives this research endeavors to work with First Nations individuals and communities to test whether or not those groups with elevated MTB rates have a higher frequency of tuberculosis-susceptibility gene polymorphisms compared to the general First Nations population. The specific aims of this research are: (1) to identify and assess the relative contribution of host's immunogenetics, the strains of MTB, and key socioeconomic risk factors, contributing to MTB infection using a geographic information system (GIS) for data modeling; (2) to facilitate and develop programs that will enable community members to voice their personal direct and indirect experiences with MTB through the collection of traditional knowledge and narratives. This presentation will describe some preliminary results of the analysis of a panel of purported tuberculosis-susceptibility genes and single nucleotide polymorphisms associated with tuberculosis (NRAMP1, Vitamin D Receptor, CCR5, HLA, and cytokine SNPs) from a northern Canadian Dené cohort. The Dené have a unique history and prehistory in relation to other First Nations populations and they have had a unique experience with early European-decent populations and the resulting exposure to infectious diseases. This distinctive history may in part account for the observed variation in the immunogenetic profile within the contemporary First Nations populations.

Is the FORDISC 3.0 a Useful Tool for the Sex Determination of the Medieval Population of Westerhus, Sweden?

Christine Lawrie, Lakehead University

The determination of sex is an important part of the osteological examination of human remains. The aim of this paper was to test the accuracy of the FORDISC 3.0 (Ousley and Jantz 2005) in determining sex in a medieval Scandinavian population. The mandibular sex determination function of FORDISC 3.0 was tested on mandibles from the Westerhus collection, a medieval population from central Sweden (n=122). The data was entered in the FORDISC 3.0 program and tested against the original sex determination by Nils Gejvall in 1960. Additionally, the current investigator did gross morphological sex determination based on mandibular traits as well as pelvic assessment for comparison. The results of the study showed that the mandibular sex determination function of FORDISC 3.0 agreed with neither the original assessment nor those by this investigator. The latter was able to match the original results more closely than the FORDISC 3.0 program, using morphological traits of the pelvis and mandible. It was therefore not a useful tool in the sex determination for this population. This study has implications for the use of FORDISC 3.0 not only on archaeological material but also in forensic contexts. The FORDISC 3.0 is intended for use in a modern forensic context. Although this study showed that FORDISC 3.0 was not accurate in determining sex in the Swedish medieval population, the results are important in illustrating the weakness of the program in determining sex in any unknown human remains. The importance of population specific data is underlined by the results of this study.

A Tale of Heads: 3D Trabecular Microarchitecture in Paired Second Metacarpals as a Test of the Articular Constraint Model

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A key question in the analysis of 'bone functional adaptation' concerns the differential response of cortical versus trabecular bone, and the relative stability (or constraint) of articular morphology to non-customary mechanical loading (Lieberman et al., 2001; Ruff et al., 1991). The fundamental premise of the 'articular constraint' model (ACM) is that, in order to maintain integrity of both hard and soft tissues, articular surface morphology is argued to be less responsive to mechanical loading, particularly in contrast to anatomical sites such as the mid-diaphysis. The ACM posits that loading across joints is accommodated by adaptive modeling of sub-cortical trabecular microarchitecture within epiphyses. Given that humans are primarily right-handed, and that handedness produces differential mechanical loading, we tested the articular constraint model by examining asymmetry in several measures of trabecular microarchitecture in the distal epiphysis of the second metacarpal assessed by 3D microcomputed tomography. Asymmetry was evaluated by t-test and bootstrap analysis against a null hypothesis of Right – Left = 0.0 for 9 microarchitectural variables. Of these, two were not significantly asymmetrical (trabecular spacing and degree of anisotropy) though favoured the left side, while one (bone specific surface) exhibited a significant left-hand bias. The rest were right-biased, including bone volume fraction, trabecular number, connectivity and a preponderance of plates versus

rods. While not significant, the greater trabecular spacing seen in the left metacarpal head likely reflects the greater proportion of rods versus plates, and the relatively greater isotropic orientation in the right metacarpal may reflect a greater diversity of loading orientations than that experienced by the left hand. In sum, the results of this study support the articular constraint model in demonstrating significant adaptation in trabecular microarchitecture to a presumed right-hand bias in functional loading. In addition, they indicate that noninvasive 3D imaging at high resolutions offers a viable approach to identifying lateralized behaviour in skeletal remains of past populations, including fossil hominines.

This research is supported by the Natural Sciences and Engineering Research Council of Canada (RL).

"What can we do to reverse this trend?" A Community-based Diabetes Care and Prevention Research Project in First Nations on Manitoulin Island

Marion Maar, Northern Ontario School of Medicine, Laurentian University

Research shows that type II diabetes mellitus is a health concern of epidemic proportions in Aboriginal communities. In recent decades, there has been an increase in provincial and federal health care services focusing on Aboriginal diabetes prevention programs. In addition there has been considerable research related to diabetes in Aboriginal communities. Despite these new programs and research, diabetes is still on the upswing in Aboriginal communities.

Viewed through the lens of Critical Medical Anthropology, it is clear that high rates of chronic illnesses such as diabetes are affecting indigenous populations worldwide and are closely tied to a history of colonization, marginalization and power imbalances. While this analysis is congruent with traditional Aboriginal knowledge, this understanding alone is not enough to improve Aboriginal community health.

To understand what will change health conditions for the better and more specifically, reduce diabetes rates in Aboriginal communities, First Nations in the Manitoulin district are collaborating with researchers and health care workers on a regional diabetes care and prevention research project. In the current phase of the research project an interdisciplinary team of university and community-based researchers are conducting in depth consultations in the region to gain an understanding of local factors such as patient, provider and community issues which influence diabetes care and prevention.

As the lead university-based researcher, this presenter will discuss the relevance of anthropological theory and methods in navigating cross cultural research ethics, minimizing societal power differentials in the area of research, and negotiating research ownership and application of results.

Ethical Aboriginal Health Research: Can Culturally-based Aboriginal Values and Mainstream Research Ethics Come Together?

Lenore Manitowabi, Noojmowin Teg Health Centre, Little Current, Ontario

Aboriginal health organizations are often contacted by researchers who want to conduct research in Aboriginal communities, however few researchers are prepared for the reality of how to design, implement and complete a successful project in partnership with First Nations. As the chair of an Aboriginal research ethics committee, the presenter will discuss how Aboriginal health agencies on Manitoulin Island are working to increase community capacity and self-determination in health research.

Noojmowin Teg Health Centre is a health access centre located on Manitoulin Island in Northern Ontario. In partnership with the three other regional health authorities and seven First Nations communities, staff at this centre coordinated the development of a community-based Research Review Committee. The function of this committee is to promote ethical health research in First Nations communities in the Manitoulin Island district. The committee researched local Aboriginal views on research ethics and used these Aboriginal values as the foundation for the development of Aboriginal research guidelines. The manual provides tools to assist communities to make informed decisions about health by providing guidelines for the review and evaluation of proposed research projects. It provides concrete strategies to empower communities to maintain ownership and control over research projects and access to research data. It is also an educational tool for researchers.

The presenter will discuss several key elements involved in the development and implementation of culturally-based Aboriginal research guidelines: 1) Importance of a community process for the development of research guidelines. 2) Overview of a guidelines manual for ethical Aboriginal research and the review process, 3) how community-based Traditional Aboriginal values and ethics are incorporated into health research and 4) role of these guidelines in fostering good relationships between community and university partners and 5) their role in producing research that is beneficial for the health of local communities.

A Test of Osteometric Sorting of Commingled Human Remains

Stephanie Marciniak, Trent University

The commingling of remains creates a challenge with personal identification, since there are few indications regarding which skeletal element belongs to which individual. This research evaluates the Byrd and Adams (2003) osteometric method of sorting commingled human remains. A test was conducted on 30 artificially commingled skeletal remains from the Grant Skeletal Collection. Standard osteometric measurements were taken from the humerus, ulna, radius, femur and tibia of each individual. Lower body portions (such as the femur) were utilized to assess whether an isolated upper body bone (such as the humerus) could have originated from the same individual and the reverse was attempted (associating an isolated lower body bone with the upper body portion). The Byrd and Adams (2003) regression models assessed the significance of the relationship between the two selected bone specimens. The independent test revealed a 0.92% success rate for correctly associating skeletal elements from the same individual and a 78.65% success rate for correctly sorting skeletal elements from different individuals. Ideally, each skeletal element fits one prediction interval but the results produced broad prediction intervals where a single element fitted into multiple prediction intervals. The independent test results confirmed the reduced discriminatory power of the osteometric method when applied to individuals of similar body size. Byrd and Adams (2003) broad reference sample composition results in a general model of sorting whereby population-specific variation remains undetected. Based on the limitations of osteometric sorting, it is recommended the technique should not be employed in a commingled context unless the researcher can fulfill all of the requirements necessary to ensure a successful application.

A Radiological Critique of Scurvy Diagnoses in Bioarchaeological Samples

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This study uses a clinical framework to evaluate the presence of scurvy in the skeletal remains of 8 coastal Maya sub-adults that have evidence of cranial lesions consistent with bioarchaeological descriptions of scurvy. Scurvy is the clinical manifestation of chronic vitamin C deficiency, which results in the inadequate formation and maintenance of connective tissues. Lesions attributed to scurvy have been frequently reported in the bioarchaeological literature in the form of well-patterned, localized porosity in bone associated with both the infratemporal fossae and orbits of sub-adult individuals. Ortner and colleagues have hypothesized that these lesions primarily occur as a reaction to vascular breakdown and soft tissue hemorrhage. Despite anatomical and physiological support for this hypothesis, similar skeletal lesions have not been identified in modern clinical contexts. The clinical evaluation of scurvy does, however, provide a framework for evaluating the presence of this condition in past populations. Modern clinical diagnosis of sub-adult scurvy is, in-part, established on the presence of 11 separate but related radiological signs in the postcranial skeleton. If the cranial lesions identified as scurvy in bioarchaeological contexts are truly representative of vitamin C deficiency, then related post-cranial radiological signs should co-occur in those same individuals.

Post-cranial radiographs were obtained for each individual and evaluated for the 11 clinically established radiological criteria. Of the 11 radiological signs, only 2 were observed in any one individual and were the least diagnostic of the set. The relative lack of post-cranial radiological evidence in these individuals suggests that infratemporal and orbital lesions identified as scurvy in bioarchaeological contexts may, in fact, not be associated with vitamin C deficiency. This study underscores the importance of evaluating skeletal pathology in past populations based on modern clinical expectations.

Experiments in Ochre Staining on Bone

Jaimie McIntyre and Mirjana Roksandic, University of Toronto

This paper examines the possible effects of tattooing and ochre staining on bones. Our starting point is the Mesolithic skull from Cabeço da Arruda (Muge Valley, Portugal) housed in the Museo Geologico (Lisbon), with an asterisk/star on the left parietal. The symbol consists of five lines, crossing at a mid point, 4cm in diameter. We examine the three possible explanations for the occurrence of this mark: tattooing (previously suggested by Teles Antunes), ochre staining after decomposition and ochre staining prior to decomposition. Experimental staining and tattooing was performed on rabbit carcasses, whose hair was sheared to resemble hairless human skin. On the first rabbit, two lines were tattooed into the skin of the head. A second rabbit was de-fleshed, and two lines were painted on one side of the skull and carved and painted on the other. The third was covered with powdered ochre. All three were buried and excavated after the decomposition took place. We propose a possible explanation for ochre staining in this and other burials reported to show evidence of tattooing.

Diet, Foraging and Colour Vision: Evaluating the Niche-divergence Hypothesis as an Explanatory Mechanism of Polymorphic Colour Vision in White-faced Capuchins (*Cebus capucinus*)

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Most species of New World monkeys possess an X-linked colour vision polymorphism. Correspondingly, males and homozygous females are dichromatic (red-green colorblind), whereas heterozygous females are trichromatic (more comparable to normal human colour vision). Several hypotheses have been proposed to explain the evolution and maintenance of this unique polymorphism. Here, we evaluate one of these, the niche-divergence hypothesis, which predicts that animals of different colour vision phenotypes will occupy distinct ecological or visual niches within a heterogeneous habitat and therefore reduce intragroup competition for resources. Specifically, we evaluate whether dichromats and trichromats differ from each other in diet or preferred foraging location. Dichromats are predicted to feed more on cryptically coloured fruit and invertebrates, whereas trichromats are predicted to feed more on distinctly colour fruit and non-cryptic invertebrates, as previous research has indicated foraging advantages to individuals of each phenotype for the respective food type. Previous studies also predict that dichromats and trichromats will prefer different heights in the forest and densities of foliage cover, based on the differences of available ambient light. We conducted seven months of behavioural observations via focal animal sampling of two groups of white-faced capuchins (N=35) living in Santa Rosa National Park, Costa Rica. The colour vision phenotype of each individual was determined non-invasively via extraction of fecal DNA and amplification and sequencing of the red-green opsin gene. We found that dichromats and trichromats did not differ from each other in the time they spent feeding on different types of fruits or invertebrates. Furthermore, there were no differences between di- and trichromats in the amount of time they spent foraging at different heights in the forest or under different degrees of foliage cover. We conclude that, in so far as these variables are concerned, niche-divergence does not explain the colour vision polymorphism seen in this population. It is possible that the social and physiological characteristics of these monkeys, as well as their current habitat, may limit the opportunity for intraspecific niche differentiation.

Winter Excavation on Trial

Catherine Merritt, University of Toronto

In most instances, clandestine burials are discovered and excavated during the summer months by forensic anthropologists; however, large parts of Canada, the US, Europe, and northern Asia exhibit seasonal weather changes throughout the year, leaving the potential for the location of interred remains to be reported to authorities during the winter months. The purpose of this project was to evaluate and adapt current forensic excavation techniques in locating and collecting evidence of potential forensic significance during the winter months, while maintaining the high standards necessary for admissibility of evidence into the courtroom. Methods: Informant information was used to approximate the gravesite area. Standard summer excavation protocols, tools, and equipment were used, although extra equipment such as a heater and generator were required to thaw the soil above the gravesite. The Bisect Line Technique was attempted but due to time constraints and

degrading soil conditions caused by the constant heat, the Horizontal Excavation Technique was used for the excavation. Results: Once the leaf litter above the gravesite was removed, there were no obvious signs of a grave depression or grave cracking on the topsoil; there was no vegetation growing on or around the gravesite; there was no evidence of a backfill halo observed; and there were no gravesite soil changes visible because the soil had a patchy dark and light appearance due to the presence of the frost. However, once the first layers of soil were removed, three observations indicated the presence of a burial: there was a difference in the compactness between the soil that was determined to be directly on top of the grave and the soil surrounding the grave; there was a visible colour contrast between the backfill soil of the grave and the undisturbed soil surrounding the grave; and there was new root growth observed above the grave. Conclusions and Recommendations: There are several challenges to locating and excavating interred remains during the winter months, but even with these challenges grave indicators can still lead investigators to the precise location of a burial. If the appropriate time and resources were available, and the informant data led to a reasonable estimation of the burial site, it is recommended that investigators perform the winter excavation.

Three-dimensional Visualization and Analysis of a Prehistoric Arrow Injury Using High-Resolution Computed Tomography

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High-resolution computed tomography (HRCT) can be a useful tool in a variety of anthropological analyses including paleoanthropology, skeletal biology, archaeology, and forensics. In this study we apply HRCT and techniques of three-dimensional (3D) visualization and quantification to the analysis of a prehistoric arrow injury in a 700-year old human tibia from Norris Farms #36, Illinois. The proximal tibia, with embedded stone arrowhead surrounded by well-remodeled bone, was scanned on the HRCT system at the Center for Quantitative Imaging at the Pennsylvania State University at two different voxel resolutions. Serial cross-sectional scans were collected for the proximal 40 mm of the tibia with a slice thickness of 0.0974 mm and an x,y pixel size of 0.0859 mm. A second set of scans was collected at higher resolution focusing on the embedded arrowhead on the lateral side of the tibial plateau. This second dataset of HRCT scans was collected with a slice thickness of 0.0369 mm and a pixel size of 0.0303 mm. Both scan datasets were reconstructed as 1024x1024 TIFF images. The visualization and analysis software Amira 3.1.1 was used to segment the arrowhead as well as the surrounding cavity and to obtain volumetric and linear measurements for both the arrowhead and cavity. Once a 3D surface reconstruction of the arrowhead was obtained, the trajectory of the projectile was estimated by plotting vectors through the arrow and the likely point of entry on the anterior margin of the lateral tibial condyle. Rather than traveling in a straight line to its final resting place, the tip pitched distally and the entire point rotated counterclockwise as the arrow passed through cancellous bone. It is likely that the trabecular bone structure in this part of the tibia together with shaft movement affected the trajectory. This study demonstrates the potential utility of HRCT together with 3D quantification and visualization in anthropological analyses.

Measuring Apical Translucency in Whole Teeth: Manual versus Digital Approaches

Collin Moore, Department of Anthropology, University of Manitoba

In archaeological skeletal assemblages, teeth are a valuable source of biological data for many reasons. Adult age at death may be acquired by a variety of regressive dental changes. Translucency of the tooth root has been shown to be highly correlated with individual age and is now used alone in some cases. There are two widely used methods to acquire this age data: histology and light penetration through intact root. In some instances, however, specimens can not be destroyed because of cultural, curatorial, or religious reasons therefore only permitting analysis on undamaged teeth. A dental sample (37 canines) analyzed by 'traditional' light box and caliper measurements were compared to a new digital imaging technique. Although both methods produced favorable results, differences in measurements between observers were found in some cases. This discrepancy may be due to small sample size, post depositional factors, or differing experience of the observers; results will be discussed.

Exploring the Origins of Human Sacrificial Victims at Iximche, Guatemala Using Oxygen Isotope Analysis

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The oxygen isotope compositions ($\delta^{18}\text{O}$) of third molars from decapitated crania at the Postclassic Maya site of Iximche were analyzed in order to test the hypothesis that these sacrifices were foreign to the site. Most of these individuals had non-local $\delta^{18}\text{O}$ values. Adult males had the widest range of foreign $\delta^{18}\text{O}$ values, and several young adults of both sexes were also identified as foreign. Adult females, however, were all identified as local to the site. Because $\delta^{18}\text{O}$ values were observed both above and below the established local range, more than one possible region of origin was represented among the victims. These data are used to investigate the possible role(s) of sacrifice at Iximche and explore the social and political interactions of the Late Postclassic highland Maya.

Changes in Infectious Disease Morbidity During the Second Epidemiological Transition

Janet Padiak, McMaster University

The second epidemiological transition (Armstrong et al 1996) identifies the period in which the dominant causes of disease and death shifted from infectious to non-infectious in etiology. Most of the research on this transition is based upon mortality information and very little is known about shifts in morbidity. This paper looks at patterns of non-combat illnesses and death among the soldiers of the British army from 1830 until 1913. Changes in mortality were overwhelmingly influenced by a reduction in rates of tuberculosis around the middle of the century. However, tuberculosis accounted for only a small percent of morbidity; it was the high fatality ratio that permitted so much mortality from this disease. Instead, morbidity declined because of a reduction in conditions associated with greater personal and domestic cleanliness, such as eye conditions and epidermal infections as well as a reduction in respiratory diseases and fevers.

A Novel High-Throughput 3D Morphometric Method For Mean Shape Visualization and Comparison

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The fast pace of scientific research in the 21st century demands the production of results at an increasingly rapid speed. Morphometric research has had difficulty meeting this demand in the past due to the intensive user-interaction required for landmarking in the currently available methods; rendering it unable to efficiently analyze 3D shape. However, the information acquired through morphometrics has the ability to answer important questions about morphology in evolutionary and developmental contexts. Here we present a new high-throughput technique for the quantification and comparison of 3D shape that semi-automates the data collection process. This 3D superimposition method takes 3D reconstructions of several shapes to create a single mean shape that contains information from all the individuals. The resulting mean shape can then be compared to others. The distribution of variance can also be mapped onto mean shapes for particular samples or compared among samples. We demonstrate this method with micro-CT data for both embryos and adult skulls of several different mouse strains to show its ability to capture shape differences and within-sample variance. This method is not intended to replace existing morphometric techniques. However, it will extend the existing toolkit by creating allow the high degree of standardization and rate of throughput that large scale phenomic analyses require. This method thus has the potential to elevate the importance of morphometric analysis within both evolutionary and biomedical contexts.

Stable Isotope Analysis and Geographic Origins of 19th Century Port Hope Pioneers

Catherine Paterson, Trent University

The aim of this research is to determine the geographic origins of 26 individuals, known as the Hawkins collection, who were buried in the Old Wesleyan Methodist Cemetery in Port Hope, Ontario between 1830 and the mid 1870s. This was done using stable oxygen isotope analysis of the carbonate component of bone and enamel. Analysis of nine First Nations individuals from burial sites near Campbellford and Lake Scugog provide the local isotopic signature. $\delta^{18}\text{O}_\text{c}$ values obtained from the analysis of the enamel of the Port Hope individuals range from 22.67 to 26.91 (-6.19 to -11.52 when converted to $\delta^{18}\text{O}_\text{w}$) indicating that they originated from Upper Canada, the Northeastern United States, and the British Isles. All seven children under the age of 15 were born in the Port Hope region. Twelve of the 16 adults of known age older than 15 are of non-local origin and often relocated during their childhood.

Hand Manipulation Skills in a One-Arm Gibbon

Jacqueline Prime, Department of Anthropology, Southern Illinois University, Carbondale

Previous research focusing on hand manipulation skills in adult gibbons at Lincoln Park Zoo and Toronto Zoo has demonstrated that gibbons are quite capable of using their hands to manipulate objects in a variety of ways, incorporating both independent use of their

fingers and thumbs, and concurrent use of their digits to handle items. This study presents a comparison between the juvenile male offspring of the Lincoln Park subjects and his adult counterparts in order to gain insights into the development of hand manipulation skills in gibbons and offer some suggestions about the importance of hand manipulation skills for these apes.

The juvenile male offspring of the Lincoln Park subjects provided an interesting point of comparison with the adult subjects for two reasons: [1] because of his young age he provides a comparative model for understanding hand manipulation skills in developing gibbons versus adult gibbons; and [2] as a result of an incident that occurred only a few weeks prior to this study, the juvenile male in the Lincoln Park family unit has only one arm. Compared with the adult gibbons, the juvenile male appears to be very similar in his use of structural objects within the enclosure; however there appear to be significant differences in the way this individual handled various introduced items within the enclosure. In stark contrast to adult gibbons, the juvenile male rarely used only his thumb to manipulate objects, often employing the finger-and-thumb in conjunction when handling both hard and soft objects. And he exhibited unique adaptations in behaviour to manipulate suspended versus free-moveable objects within the enclosure. Despite his physical impairment, the juvenile male has adapted quite successfully and does not appear to be restricted in any way. Overall, his hand use is quite similar to adult gibbons, and though he does compensate for his missing arm by extensively using his mouth and legs, he is much more likely to change his positional behaviour in a manner that allows him to access and manipulate objects with the hand that he does have, proving that hand manipulation skills are of great importance to all gibbons.

Egyptian Identities: Application of FORDISC 2.0 to an Egyptian Burial Population

Brian Pritchard, University of Western Ontario

The question of who the ancient Egyptians were has long been debated by Egyptologists and archaeologists alike. Past and present studies have made extensive use of morphological, metric, non-metric, blood, and dental data to support claims of a Negroid and/or Caucasoid basis for the ancient Egyptian population. This presentation addresses the question of who the ancient Egyptians were by looking at metric traits of crania taken from a burial population recovered from the Greco-Roman period (A.D. 100-400) cemetery of Kellis 2, located in the Dakleh Oasis, Egypt. In addressing the question of who the ancient Egyptians were, I use the crania recovered from Kellis 2 to test the utility and appropriateness of using FORDISC 2.0 for making sex and ancestry determinations. As the results of this study show, the Dakleh skeletal material do not readily fit into the racial typology provided by Howells and used in FORDISC 2.0 and the sex determinations made by FORDISC 2.0 reveals a systematic error where male crania from Kellis 2 are habitually misclassified as female. Given this, I discuss why FORDISC 2.0 is not particularly suited to archaeological populations and more broadly why the use of discriminate functions in making classifications involving folk taxonomies such as race must proceed with caution.

Isotopic Evidence for Diet in the Vagnari Skeletal Sample (2nd - 4th c. AD)

Tracy Prowse, Department of Anthropology, Southern Illinois University, Carbondale

Excavations at the site of Vagnari, South Italy, have revealed the presence of a large settlement consisting of housing, extensive industrial areas, and a cemetery dating to the 2nd to 4th centuries AD. Archaeological evidence suggests that this site and the surrounding territory were owned by the Roman

emperor and managed by a local administrator. Based on the modest grave goods found in the burials, it is hypothesized that this population consisted of slaves or freedmen who lived and worked at Vagnari.

This study examines diet in the Vagnari sample through the analysis of stable carbon and nitrogen isotopes. A comparison of the Vagnari results to isotopic data from the contemporaneous Isola Sacra skeletal sample (a coastal population near Rome) indicates that the people at Vagnari were consuming a predominantly terrestrial-based diet. Within the Vagnari sample there is no difference in dietary signal between males and females, nor is there any significant variation in relation to adult age-at-death.

Little is known from the historical records about the daily lives of Roman rural populations, so the ongoing Vagnari bioarchaeological project will provide valuable insight into a relatively unknown segment of the ancient Roman population, the workforce of a rural Imperial Roman estate.

Cervical Spinous Process Morphological Variation in two Portuguese Skeletal Collections

Dori Rainey, McMaster University

The implications of variable morphology expressed in the spinous processes of the second to seventh cervical vertebrae have been speculated upon since the 1800s. It is classified as an epigenetic trait and has shown different frequencies between populations from Africa and Europe, providing the potential for use in ancestry determination. Recent results indicate that the bifid/non-bifid classification of the C3 and C4 spinous processes are significant in distinguishing between American Blacks and American Whites. However, little data exists on cervical spinous process morphology occurrence in other populations.

Data was collected from two Portuguese skeletal collections, the Luís Lopes Skeletal Collection housed at the Museu Bocage in Lisbon and the Coimbra Identified Skeletal Collection housed in Coimbra, as part of a larger research project on epigenetic variation in the infracranial skeleton. These are identified historic skeletal collections excavated from municipal cemeteries in the respective cities. The Portuguese sample consists of 292 individuals; 148 males and 144 females with 131 individuals from the Coimbra Collection and 161 from the Lisbon Collection. The individuals included in this sample were born between 1833 and 1938 and died between 1898 and 1963.

The spinous processes were scored as bifid, partially bifid, or nonbifid. The frequencies of these scores in the Portuguese sample were compared with previously published data on American Blacks and American Whites from the Hamann-Todd Collection, housed at the Cleveland Museum of Natural History in Cleveland, Ohio. Chi-square tests were performed on the frequency data and preliminary results show that the frequencies for the Portuguese collection are more similar to those of the American Whites than American Blacks. However, the feasibility of applying the Portuguese data to the ancestry predictor model is discussed. The results indicate that this morphological feature cannot be used in isolation for the determination of ancestry; rather, it must be used in conjunction with a suite of osteological traits.

The Plasmodia of Southeast Asian Primates Reconsidered

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Previously, it was believed that Orangutans (*Pongo* sp.), Asia's last surviving large ape were host to two distinct species of parasites. *Plasmodium pitheci* was identified in 1907 from a wild-caught Bornean orangutan, while *Plasmodium silvaticum* was later isolated from an orangutan housed at the SEPILOK Orangutan Rehabilitation Center in Sabah, Malaysia. This paper reports infections of *Plasmodium* sp. in wild-born, ex-captive orangutans housed at the Orangutan Care Center and Quarantine (OCC&Q) in Kalimantan, Indonesia. We microscopically examined blood from 1) OCC&Q residents (n=69); 2) newly confiscated orangutans (n=14); and 3) previously released ex-captives (n=2). Blood from positive individuals was preserved for species determination using Polymerase Chain Reaction and sequence alignment tools. We amplified, cloned, and sequenced a ~1500 bp region of the 18S rRNA from 13 of 24 *Plasmodium* infected animals. Our sequences formed four distinct groupings of *Plasmodium* sp. infecting orangutans at OCC&Q. Our data suggest cross species infection of orangutans with macaque (*Macaca* sp.) and human plasmodia, which may have serious implications for conservation and rehabilitation efforts of endangered species.

Reconstructing Burial Position on Skeletal Material from Cabeco da Amoreira

Emily Rondel, Amy Widdifield, and Mirjana Roksandic, University of Toronto

This paper will investigate burial 80.162.79 from the Cabeço da Amoreira shell midden in the Muge Valley, Portugal, currently held in the collection of the Museu Geológico in Lisbon. The paper is part of the larger project of reconstructing burial ritual in the Mesolithic of Southern Europe. In addition to providing osteobiographic data for the two skeletons found in the burial, our purpose is to reconstruct burial position on the basis of preserved skeletal articulations. While these are normally not available for already excavated remains (except from photos and drawings), material recovered from the Muge sites are often recovered in breccia, which allows refitting of bones to their preexcavational position. To the extent possible we will infer postdepositional movement of skeletal elements in relation to the burial environment.

Three-dimensional Imaging and Quantification of the Semi-Circular Canal System in Primates

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The semicircular canal system of vertebrates enables stabilization of gaze and the integration of changing retinal images during locomotion. Here we assess the relationship between semi-circular canal size and locomotion in a sample of 207 extant mammalian species including 91 living and subfossil primate taxa. Both medical and high-resolution computed tomography (CT) data were collected for the petrosal of all specimens with voxel resolutions ranging from 0.02 to 0.5 mm depending on the x-ray system and the size of the specimen. The data were resliced in the plane of each canal, the height and width of each canal was measured, and the radius of curvature was calculated. Multiple regression analyses were performed for each canal against species mean body mass and locomotor speed using both conventional and phylogenetic generalized least squares regressions. We found that primate and other mammalian species that have fast, jerky locomotion (e.g., galagos, indri) have larger canals for their size than those that move more slowly (e.g., lorises, sloths). High-resolution x-ray CT provides the opportunity to image and visualize non-destructively the semi-circular canal systems in extant and fossil mammals and to assess their functional significance through accurate quantification.

The SSHRC Strategic Clusters Program: Children and Childhood in Human Societies

Shelley Saunders, Department of Anthropology, McMaster University

The Children and Childhood in Human Societies (CCHS) Cluster is a group of 21 anthropologists, archaeologists, human biologists and historians who share research interests in the lives, health, biology, environment and culture of children, in contemporary, historical and archaeological societies. They are drawn from seven Canadian universities, one museum (Canadian Museum of Civilization), and four international institutions and have received one year of funding from SSHRC to begin to focus their research efforts, to better utilize resources, to improve opportunities for graduate students and to expand the outreach of their research across Canada. Studies of human societies, whether in the past or the present, have often overlooked the lives and health of children. Indeed, even the concept of childhood is not clearly defined among researchers. With the focus on children, as social and physical beings, the CCHS group intends to clarify the debate around many of the issues. This poster paper introduces the group, identifies our specific goals, and describes some of the activities we plan in order to accomplish those goals. We will also be submitting a major grant

proposal to SSHRC this fall to try to secure cluster program funding to support knowledge mobilization for our theme.

Sexual Dimorphism of the Dental Tissues in Human Permanent Mandibular Canines and First Premolars

Shelley R. Saunders, Andrea H.W. Chan, Bonnie Kahlon, Hagen F. Kluge, Charles M. FitzGerald, McMaster University

Recently, methods of measuring tissue area from images of longitudinal thin tooth sections have been used to assess sexual dimorphism in the permanent dentition. The aim of this study was to demonstrate the extent of sexual dimorphism within the coronal tissue proportions of permanent mandibular canines and premolars, using area measurements of the enamel and dentine-pulp core. The sample consisted of embedded half-tooth sections from 45 individuals, all of known age-at-death and sex, collected from the St. Thomas Anglican Church historic (1821-1874) cemetery site in Belleville Ontario. The relative dentine-pulp area of the first premolars and canines displayed high levels of sexual dimorphism, as well as statistically significant mean differences between the sexes. The male canines and premolars have significantly more dentine than their female counterparts, as well as relatively more dentine with respect to overall crown size. The female canines and premolars have significantly more enamel relative to overall crown area than those of the males. These results suggest that relative area measures of crown tissues are more predictable measures of sexual dimorphism than absolute measures, and tissue proportions may remain constant despite intra-sex variation in overall tooth crown size.

Health, Disease and the Colonial Experience: Malta and Gibraltar

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Cause-specific life table analysis of two British colonies (Malta and Gibraltar) during the early decades of the 20th century illustrate the great disparity in health present in these two outposts of the British Empire. During the period 1929 to 1933, the life expectancy at birth in Gibraltar was 52.7 (+/- 0.834) and a mere 36.9 (+/- 0.256) in Malta – a 15.8 year disparity. The observed differential arose from varying macro- level qualities in the two populations (e.g., inseparability, scale, degree of urbanization, overall economic status, degree of investment by the British homeland) and micro-level qualities (e.g., family size and planning, educational level of parents).

Sexual Selection and the Evolution of Brain Size in Primates

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Since Darwin's 1871 publication on the evolution of humans and sexual selection, reproductive competition among males has been considered a powerful force in the evolution of primates. Large brain size and brain complexity in the Order Primates is unique among mammals and has been widely regarded as the hallmark of primate evolutionary history. Despite their importance to our understanding of primate evolution, the relationship between sexual selection and the evolutionary development of brain size is not well studied. The present research examines the evolutionary relationship between brain size and two components of primate sexual selection, sperm competition and male competition for mates. Results indicate that there is not a significant relationship between relative brain size and sperm competition in primates, suggesting sperm competition has not played an important role in the evolution of brain size in the primate order. There is, however, a significant negative evolutionary

relationship between relative brain size and the level of male competition for mates. The present study shows that the largest relative brain sizes among primate species are associated with monogamous mating systems, suggesting monogamy may require greater social acuity and abilities of deception.

A Brief Investigation into the Maintenance of Proximity During Estrous by Titi Monkeys (*Callicebus discolor*)

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Sexual selection theory suggests that the ability of the male to be successful in passing on genetic information to offspring generally depends on his ability to inseminate a large number of females. Thus it is difficult to explain mating systems where males do not seek out more than one partner, such as is found in monogamous species. One hypothesis that has been used to explain how monogamy may be an adaptive reproductive strategy for males is the mate-guarding hypothesis; it is in the best interest of a male to remain with his partner if receptive females are scarce since females left by one male might attract additional partners. During a long-term study of the comparative socioecology of three species of monogamous primates at the Tiputini Biodiversity Station, Ecuador, we witnessed two copulations and numerous genital inspections by the adult male and female of a group of red titi monkeys (*Callicebus discolor*). This provided an interesting opportunity to evaluate aspects of the mate guarding hypothesis by examining proximity changes and sex differences in responsibility for proximity maintenance during opportunistic sampling of estrous and non-estrous periods. We determined the adult female to be in estrous from June 3 to June 21, 2006 based on behavioural cues and reports of ovarian cycle length in a closely related species (*C. cupreus*, Norconk 2006).

We examined proximity patterns within the adult male-female dyad in this group by examining the proportion of time they spent within 3m and within 1m of each other. We found a significant difference in the amount of time they spent in both of these proximity categories during the estrous versus the non-estrous period (3m: $p < 0.0018$; 1m: $p < 0.0028$). Additionally, we calculated Hinde's Index (Hinde et. al. 1974) for the male-female dyad to determine differences in individual responsible for maintaining proximity in estrous and non-estrous periods. We found the male was more likely responsible for proximity maintenance during the estrous period while, both sexes were equally responsible for maintaining proximity to one another during the non-estrous part of the year. Although preliminary, our results are consistent with the mate-guarding hypothesis.

The Mysterious Rickley Remains

Jennifer Sharman, University of Western Ontario

The Rickley site, a southwestern Ontario First Nations site, was excavated over thirty years ago. There are no records of past analyses for two individuals recovered from the Rickley site. As these individuals have the potential of adding important information to our knowledge of burial patterns and health and disease among First Nations peoples, analysis of their skeletal remains was undertaken in preparation for reburial. Upon investigation, I

realized that there were a minimum of four individuals contained in the boxes, rather than two, as labeled. I concluded that the individuals were from the Terminal Archaic to Early Woodland span, and likely were buried in either the same or adjacent burial features. The site report was procured later, and will be compared to my skeletal analysis. In this presentation, I will outline the results of my comparison of the skeletal analysis to the site report.

Patch Occupancy Modeling: Distribution and Abundance of Honduran Primates in Cusuco National Park, Honduras

Kymberley Snarr, Centre for Environment, University of Toronto

Establishing the very basic data of distribution and abundance on New World primates has been difficult due to their arboreal nature and often persistent hunting. In primate habitat where hunting historically or current occurs, and thick forest canopy in mountain terrain masks visualization, the commonly employed method of standard distance cannot be employed. Here I present the situation of Cusuco National Park (CNP), Honduras.

CNP is a protected area in Honduras which contains 55 km² of forest including broad-leaved, pine, and dwarf forest. Patch occupancy modeling was employed to gain insight into distribution and abundance of the three primate species ranging in Cusuco National Park, mantled howlers (*Alouatta palliata*), white-fronted capuchin (*Cebus capucinus*), and Central American spider monkey (*Ateles geoffroyi*). Vocalizations, visualizations, and characteristic leaf-rustling were employed as indicators of presence. Using proportion of area occupied (PAO), an interpretation on species distribution and population density was carried out.

During the 2006 research season, using PAO, it is estimated there are 440 mantled howlers persisting in the CNP. With only one confirmed sighting of Central American spider monkeys and white-faced capuchins in the park during three field seasons, they are found to persist in the park in small and likely unsustainable numbers.

Human Sacrifice: A Bioarchaeological Corroboration

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The archaeological site of Marcahuamachuco was a major center devoted to ancestor worship in the northern Peruvian highlands from approximately 400 CE to 1000 CE. The site occupies approximately 2.4 km² and is located atop an elongated mesa, at an elevation of 3700 m asl. The site's massive stone ruins are dominated by the Castillo, a circular structure that stood five stories tall. Upon excavation in 1986 by a team headed by John and Theresa Topic, a human sacrifice was unearthed under eight metres of fill at ground level inside the structure. The skeletal remains of 18 llamas accompanied the human skeletal remains of what was believed to be a woman and a foetus. The sacrifice was interpreted as evidence of the ideological and social importance of the Castillo to the inhabitants of Marcahuamachuco. Twenty years later, to better understand the victim(s) and the context of the possible sacrificial offering, a bioarchaeological examination of the remains was undertaken. Although the remains are highly fragmentary, using known aging and sexing methods, the MNI was determined to be two. The first set of human remains was identified as foetus approximately 34-36 weeks old. Accompanying the foetus, were the remains of a young

robust woman, approximately 156.5 cm tall. The adult bones also have distinctive markings that could indicate dismemberment.

Black howler (*Alouatta pigra*) Population Size and Characteristics Before and After a Major Hurricane

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Endangered animal populations face extinction risk from both anthropogenic and natural forces however documentation of the latter is rare. We measured the characteristics of a population of black howler monkeys 3.5 years after Hurricane Iris hit the Monkey River watershed in southern Belize in October of 2001. The hurricane presented a unique opportunity to document the effects of a natural disaster under circumstances where pre-hurricane data were available. From February to May 2004, 28.77 km² of the 96 km² forest fragment was sampled via five transects that were walked 12 times each. The resulting population data was compared to pre-hurricane data from a 52 ha study area, believed to be representative of the larger fragment, from which all monkeys were known. This comparison revealed dramatic reductions in the population and important changes to its characteristics. The population in the watershed is estimated to have dropped from 9784 to 1181 monkeys, a reduction of 88%, reflected by a 79% drop in number of social groups, as well as a 38% reduction in group size. Before the storm, 75% of social groups were multimale; after 74% of the groups were unimale. While the ratio of adult females to males improved slightly, the ratio of adults to immatures, and adult females to immatures more than doubled, indicating much lower potential for growth in the post hurricane population. These data provide the first quantitative assessment of how a major natural occurrence can affect a primate population.

Health Conditions at Norway House Residential School, 1900-1946

Melissa Stoops, University of Saskatchewan

The Norway House Residential School, operated by the Methodist Church from 1900 to 1946, was located in Norway House, Manitoba. Like other Native Residential Schools of the time, the students suffered from poor health. Tuberculosis was the most common cause of illness and death among the children. Many of the children likely contracted TB at home and the conditions in the school aggravated the disease. Children who were not previously exposed to TB would have been exposed to the disease within the school setting. Outbreak of other infectious diseases also occurred within the school. The numerous deficiencies of the Residential Schools system such as the chronic under funding, overcrowding, poor nutrition, little to no medical facilities and poorly built and maintained buildings have been linked to the health problems present at Norway House and at other residential schools. In this presentation, I will discuss the prevalence of TB as well as other infectious diseases at the Norway House Residential School and the impact of the living conditions at the school and the poor health of the children.

Weaning and Linear Enamel Hypoplasia in Cave Bears (*Ursus spelaeus*)

Sarah Swayze and Mark Skinner, Simon Fraser University

This paper examines the etiology of a particular occurrence of linear enamel hypoplasia (LEH) in some *Ursus spelaeus*. This LEH takes the form of a groove around the permanent canine tooth near the cemento-enamel junction (CEJ). Previous workers ascribed the groove to enamel wear by vegetation, linking its occurrence to masticatory maladaptation, leading to extinction of the species. Modern *Ursus* species, which show not only close genetic ties to *U. spelaeus* but share very similar rates of development, are used as a model to examine physiological stress during development in cave bears. The study sample includes 114 modern bear crania from North America belonging to three species as well as three permanent cave bear canine teeth with LEH from Pecina Megara, Bosnia I Herzegovina (ca. 12 000 yrs BP). LEH is observed in 28% of modern bears. The location of LEH in both modern and extinct bear canine teeth indicates stress was experienced just prior to completion of the crown- around six months post-partum- when weaning to solid foods is commencing. The nutritional value of maternal milk decreases at this time while growth rate of the cub increases, a combination of factors that could easily lead to physiological stress, disrupting growth of the canine crown. We conclude that linear enamel hypoplasia of the permanent canine in *U. spelaeus* can be linked to weaning. In that LEH occurs commonly in recent *Ursus* populations, its occurrence in cave bears is not related to extinction in the latter species.

3D Riddles of the Radial Wrist: Derived Carpal Morphology in the Genus *Homo* and the Implications for Understanding the Evolution of Stone Tool Behaviors in Hominins

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In this study, three-dimensional modeling and analytical tools are used to perform quantitative comparative analyses of relative joint surface areas, orientations, and curvatures of the scaphoid, trapezium, trapezoid, and first and second metacarpals, in several living and fossil primate genera. The extant and extinct genera examined include: *Homo* (*sapiens*, *neanderthalensis*, and *habilis*), *Australopithecus*, *Pan*, *Gorilla*, *Pongo*, *Papio*, *Theropithecus*, and *Nasalis*. Although distinct morphological patterns of the scapho-trapezio-trapezoid (STT) region are observed within each genus, this presentation focuses on the differences that directly impact interpretations of the evolution of stone tool behaviors in hominins. All members of the genus *Homo* show a combination of shared, derived features in their STT anatomy that are not observed in the other primate genera, including *Australopithecus*. The single exception to this is the OH7 hand material (*Homo habilis*), which does not exhibit the pattern seen in later *Homo*. Rather, OH7 shows a perplexing combination of features that suggests it may well represent a composite of hand and wrist bones from more than one primate species. The observed STT synapomorphies of *Homo* are a consequence of carpal shape change, and developmental evidence indicates that these changes are present immediately following cavitation of the carpal blastema, well before the processes of chondrification and ossification take place. Biomechanically, the reconfiguration of the STT region in *Homo* enables the wrist to withstand large loads and forces generated either

internally (from muscle contraction) or externally (from object use) during manipulative behaviors; the nonhuman primate wrist does not show this capacity and is instead better designed to handle loads and forces generated during locomotor behaviors. Other aspects of hand and wrist anatomy, together with behavioral evidence from the extant great apes, suggest that all Plio-Pleistocene hominins likely made and used stone tools. However, the 3D quantitative evidence of the STT region suggests that possibly only one of these hominin species underwent the morphological specializations of the STT region necessary to enhance both its power and precision grips. At present, the fossil evidence suggests that this important evolutionary event is likely associated with the emergence or early development of the Acheulian tradition.

Bone, Fire and Ice: The Effect of Experimental Water Freezing on the Fragment Size of Cremated Bone

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Cremated human and non-human remains form an important part of some archaeological assemblages. The purpose of this study was to evaluate the effects of water freezing on cremated bone. Differentially incinerated deer bone was frozen repeatedly to simulate the seasonal freezing and thawing of cremation burials. The results indicated that the action of water freezing further fragments the already extremely fragmentary remains. It was observed that 'smoked' bone and trabecular bone fragmented more readily and resulted in smaller fragments than 'calcined' and cortical bone, respectively. The results raise important considerations for the interpretation of cremation burials.

A New Universal Method for Estimating Stature from Long Bone Length: But Professor, What Race Is My Femur?

Andrew Tuck and John Albanese, University of Windsor

The title of our paper is an allusion to Kennedy's (1995) publication which is both a symptom and a reinforcement of the single greatest problem in forensic anthropology: reliance on a racial framework for assessing and interpreting human variation. In recent years, racial terms have been replaced with ancestry terms, but the underlying theoretical problems remain, if only more obscured by language. On a theoretical level, the racial paradigm for human variation is not supported by skeletal or genetic data. On a practical level, there are two problems with the use of race-specific methods in forensic contexts. First, they provide a false sense of the applicability of methods. For example, simply because a method is developed using 100 Whites from the Terry Collection does not mean it will be applicable to Whites in real forensic cases. Second, these methods are more difficult to apply because race must first be determined for the unknown. Some methods have been developed for determining race using the femur, but these methods perform very poorly when independently tested. Even proponents of the racial approach admit that it is difficult to assess race outside of the cranium. Thus, when dealing with an isolated long bone, which of the traditional equations should be applied? In this paper, we present a new series of equations developed using a sample from the Terry Collection for estimating stature that are designed to be universally applicable. We present sex-specific equations, and equations

where stature can be estimated even when sex cannot be determined. The equations perform very well when tested on large independent sample from the FDB.

Seed Dispersal by White-Faced Capuchins (*Cebus capucinus*): Evaluating Quality

Kim Valenta and Linda M. Fedigan, University of Calgary

White-faced capuchins have been hypothesized to benefit some of their food trees via seed dispersal. Studies of animal dispersal of seeds typically evaluate both the quantity and the quality of dispersal. Quality of seed dispersal has been measured as: (1) the effect of dispersed seed location; (2) the suitability of microhabitat variables for seed germination, and seedling growth/recruitment and (3) the effect of gut passage on germination potential. Here, we focus on the third measure, examining the effect of passage through the capuchin intestinal system on germination potential and time to germination of passed seeds. We also examine the effect of the fecal matrix on seed germination and time to germination.

Over the course of a seven month study period, we studied adult white-faced capuchins in two groups living in Santa Rosa National Park, Costa Rica. We followed 15 individuals continuously for entire days, or as many hours as possible. We recorded every seed-bearing food ingested and each defecation event. We collected, identified, counted, planted and watered the five most commonly encountered species of seeds in fecal samples (N=2014). Approximately half of the passed seeds were cleaned of feces. These were planted alongside seeds of the same species that we had removed directly from fruit (N=1028). We planted the remaining passed seeds in capuchin feces alongside an equal number of seeds that we cleaned of feces and placed in soil collected from the defecation location. Seeds were checked daily for germination. Preliminary analyses indicate that gut passage increases germination potential in 3 of 5 species (*Acacia collinsii* (AC): increase of 11%, *Genipa americana* (GA): 9%, *Casearia arguta* (CA): 23%); decreases potential for 1 species (*Sciadodendron excelsum* (SE): 13%); and has no effect on the fifth species (*Trichilia martiana* (TM)). Additionally, the presence of feces either has no effect (AC, GA and CA), or hinders germination (TM and SE). These data provide initial support for the hypothesis that capuchins benefit some of their food trees via seed ingestion and gut passage. We plan to analyze the first and second measures of seed dispersal quality described above to further test this hypothesis.

Mineral Yield as an Indicator of Bone Quality for Carbonate Analyses

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The vulnerability of bone carbonate to diagenesis necessitates careful evaluation of samples in stable isotope studies. Various methods of evaluation, many of which are time-consuming and costly, have been employed in studies of bone diagenesis. Here we describe a simple indicator with good potential for assessing bone mineral quality. Treatment of bone mineral for stable isotope analysis of carbonate routinely involves removal of organic material and diagenetic carbonates with NaOCl and acetic acid solutions respectively. This study explored the factors determining the final yield of bone mineral after this process, expressed as the percentage by weight of the initial bone sample and referred to here as 'mineral yield.' Bone samples were weighed after NaOCl treatment and again after acetic acid treatment, allowing loss in mass during each step of the process to be determined. Contrary to expectations, the results suggest that sample crystallinity prior to treatment is not the major determinant

of mineral yield. Instead, mineral yield appears to be primarily determined by loss in mass in NaOCl. As such, it can be considered a reflection of the organic content of the bone sample. Because organic content has been used in other research as an indicator of sample quality for archaeological bone carbonate analysis, this suggests that mineral yield could be useful as a sample quality indicator. FTIR analysis of a number of archaeological bone samples appears to confirm this potential: samples with high mineral yields (indicating low organic content) frequently show higher crystallinity and lower carbonate content than samples with mineral yields typical of well-preserved bone. The relationships between some of the individual preservation indicators are modest, showing that no single indicator should be relied upon in isolation. Rather, a suite of criteria should be employed. Our data support the addition of mineral yield to this suite as an initial quality screening method that is both inexpensive and easily determined incidental to sample preparation.

Methodological Issues in Northern Aboriginal Community-based Health Research

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The paper will focus on some of the unique methodological issues of doing research in northern Aboriginal communities, and an epidemiological perspective on ways for combining qualitative and quantitative methods in such research. Expected challenges include language and translation, operationalizing, and participatory versus extractive approaches regarding the development of data-gathering tools. Conducting research in communities that speak languages in addition to English and French adds a level of complexity to the data-gathering process. This necessitates engaging in dialogue about translation; often a clear and true interpretation of questions, answers and concepts in Aboriginal languages can be difficult. The perception of translators during the study development and the data gathering process (if oral interviews are used) is another important aspect that can bias collection and analysis of data. Reducing bias in data collection is a major consideration in both quantitative and qualitative approaches. Qualitative methodology can determine if the translation is correct, and if the concepts are clear to both the translator and the researcher. Standardized health measurement scales are an example of a quantitative representation of qualitative concepts that are often subject to interpretation by both researchers and respondents. In this situation, community involvement in adapting a health measurement scale, through consensus building between researcher and community, can increase its effectiveness. Operationalizing is a subjective process because a critical look at standpoint epistemology is needed when language is an issue in survey development. Mutually approved definitions of key terminology for survey tools assure that perspectives of both the community members and researchers are recognized. This participatory approach is preferred to extractive methods in community-based research because interactive dialogue about language use and interpretation is minimal in the latter. Whether the survey is orally translated or written in the language of interest, pre-testing the survey with the community is important in allowing the data-gathering tool to develop such that interpretation differences are minimized. Community participation in study development will ensure the researcher uses tools that will work for a specific community and generate useful and accurate data.

Digging Deeper into the Limits of Ancient DNA Research on Syphilis

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The search for the origins of syphilis has a long history in the medical and anthropological literature. If we know more about the emergence of the pathogen that causes the disease in humans we will understand its evolution through time and space as well as shed light on its current state in living populations. Ancient DNA techniques used to isolate *Treponema pallidum* subsp. *pallidum* DNA from archaeological human specimens provide direct evidence of its existence in the past. However to date, only Kolman et al. (1999) have been successful in this endeavour, while other attempts have failed (e.g., Bouwman and Brown, 2005; Barnes and Thomas, 2006). Why has there been little success? This paper serves to compliment and add relevant information to Bouwman and Brown's (2005) and Barnes and Thomas' (2006) discussion concerning our inability to apply ancient DNA techniques to study venereal syphilis in past human populations.

Our approach utilized 15 different human specimens from different geographies and different temporal periods; eight samples come from medically diagnosed individuals archived during the American Civil War period; six originating from the United Kingdom predating 1492 with four of these samples having been previously analyzed by Bouwman and Brown (2005); and one sample from historic Canada. Human mitochondrial and amelogenin DNA, as well as several genes from the *Treponema* organism were analyzed revealing the relatively good preservation of human multi-copy and single copy DNA but not treponemal DNA. This study also incorporates a unique molecular experiment using rabbits infected with venereal syphilis to help illustrate that treponemal DNA disseminates to bone early during the first stages of infection but is not present in later stages of the disease using the techniques presented in this study.

Malta: A Giant Step Behind in the Epidemiological Transition

Leah Walz and L.A. Sawchuk, University of Toronto

Today, the infant mortality rate (IMR, defined as the number of deaths under one year of age per one thousand live births) is a commonly calculated and familiar statistic to health researchers, and it is internationally regarded as a general barometer of health and a sensitive indicator of the state of public health and sanitary conditions. Nevertheless, a large body of research aims to identify the causes of infant death in both contemporary and historical populations. This paper will contribute to this growing body of literature, within and beyond anthropology, on the determinants of infant mortality.

In 1946, Dr. Joseph Morana, a physician in the Crown Colony of Malta, published a manuscript entitled 'An Investigation on Infant Mortality in Malta', and concluded that the chief cause of elevated rates of infant mortality among the Mediterranean island's occupants was multiparity (the average number of children born was 6-7). Several decades earlier, the Chief Government Medical Officer, Dr. Caruana Scicluna similarly argued that [i]t cannot be expected that with our high birth-rate, our death rate can fall much lower than it is at present. Further, the government regularly explained the exceptionally high rates of infant

mortality, which exceeded 250 per thousand live births until after the Second World War, as resulting from overpopulation, crowding, and excess fertility.

Based on aggregate statistics collected from Government Health Reports, Malta's Blue Books, and decennial censuses, and on the reconstitution of 106 complete families in one rural parish, this paper seeks to empirically test the assertions of health officials in early 20th century Malta regarding the associations between fertility and mortality. The relationship between infant mortality rates, as well as overall death rates, and factors such as family size, population density, population size, and average number of inhabitants per household, will be calculated over time and across localities for Malta proper and its constituent communities. Comparative materials from Gibraltar will be used to illustrate the unique character of Malta's fertility and mortality profiles. The paper will conclude with reflections on the relative importance of these factors and will offer alternate explanation for the observed relationships.

Dental Enamel Hypoplasia in Holocene Siberian Hunter-Gatherers: Evaluating Evidence for 'Weaning Stress' and 'Seasonal Stress'

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The deciduous and permanent teeth from five prehistoric hunter-gatherer groups from Lake Baikal, Siberia, have been examined for dental enamel hypoplasia. Several types of enamel hypoplasia were observed, including three forms of enamel pitting (single, linear horizontal, and nonlinear array of pits), linear vertical grooves, and linear horizontal grooves. Linear hypoplastic defects are uncommon on the deciduous teeth, but are widely distributed across the crowns of the permanent teeth. Measurement of the position of each linear enamel hypoplasia on the crown surface from the cemento-enamel junction has been converted into an estimated age of defect formation. Significant differences exist in peak ages of defect formation among groups, which has been suggested to reflect differing cultural systems of infant feeding and weaning. As well, several linear grooves are frequently present within one tooth, suggesting these stress episodes may be periodic. Periodic stress episodes may be due to various forms of seasonal stress, such as nutritional stress and/or disease stress, which may be amplified by cold climate conditions.

Tuberculosis in the Past: Should Visceral Surface Rib Lesions be Added to the Diagnostic Criteria?

Katie Whitaker, University of Durham, U.K.

Tuberculosis is a devastating disease that continues to take millions of lives every year. In the past, prior to the antibiotic era, historical records indicate that people of all classes and geographic locations were susceptible to the infection. Thus far our archaeological evidence does not correlate with records, so it is necessary for paleopathologists to improve their diagnostic criteria of tuberculosis. This study aims to examine the reliability of utilising visceral surface rib lesions to aid in the diagnosis of tuberculosis. Seventy-two individuals from the Grant Collection, housed at the University of Toronto, were separated by cause of death. The tuberculosis, pneumonia and control (non-respiratory causes of death) groups each had twenty-four individuals. The skeletons were analysed for the presence of lesions, their locations and distribution on the rib cage and stage of healing. Seventy-five

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percent of those with tuberculosis as a cause of death displayed lesions. It was also found that the same percentage of individuals with pneumonia as the cause of death had lesions. The results showed that lesions on the medial portion of the rib was most prevalent, while diffuse mixed bone lesions on fifty percent or more of ribs present was found in the majority of individuals both in the tuberculosis group, and overall. These findings suggest that visceral surface rib lesions should not be definitively added to the diagnostic criteria for tuberculosis. Instead the lesions should be considered non-specific indicators of a chronic respiratory disease, which can include tuberculosis. Overall, it is necessary for paleopathologists to continue to research to improve our diagnostic methods, so one day the archaeological record will reflect the health of populations in the past.

The Moon and the Feathered Serpent: The Geographic Identities of Sacrifices at Teotihuacan's Great Pyramids

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The residential histories of humans sacrificed for each construction phase of the Pyramid of the Moon, Teotihuacan, were reconstructed using oxygen-isotope ratios of bone and enamel and strontium-isotope ratios of enamel. Most victims appear to have been born elsewhere. Regions of origin within modern Mexico include: the Central Highlands, Sierra Madre del Sur, the Gulf Coast, and other parts of the Basin of Mexico. Areas farther afield include: the Southern Highlands, Motagua Valley, and the Maya Lowlands. The oxygen-isotope data are compared to those from the mass sacrifice at the Feathered Serpent Pyramid, Teotihuacan. Although the victims from each monument share many of the same origins, the two pyramids each contain distinctive groupings of individuals. Furthermore, the majority of Feathered Serpent Pyramid individuals had lived in the city for many years before sacrificial demise, whereas the Moon Pyramid victims had been in Teotihuacan only a short time before death. Possible political meanings of these differences are discussed.

A Pilot Study of Social Relationships, Relatedness and Dispersal Patterns of Female Ursine Colobus (*Colobus vellerosus*)

Eva Wikberg and P. Sicotte, University of Calgary

Arboreal monkeys have been largely underrepresented in wild studies of primate social behavior and genetic relatedness due to the difficulty of recognizing individuals. The objectives of this pilot study were to determine 1) if individual recognition in several groups of ursine colobus (*Colobus vellerosus*) is possible, and 2) if fecal samples and behavioral data can be reliably collected from all subjects. Six groups ranging in size from 11 to 31 individuals were studied during May-August 2006 at Boabeng-Fiema Monkey Sanctuary, Ghana. I could reliably identify 101 of 118 subjects using individual differences in body size, and shape of eye brows and tails. Unrecognized subjects were infants and juveniles. I collected 137 fecal samples from 85 individuals. Samples were stored in RNA later for subsequent analyses of genetic relationships. Behavioral data were collected ad libitum and during focal follows, with a total of 327 observation hours. Descriptive data from this study suggests that female participation in intergroup encounters and coalition formation might occur more frequently than previously reported. However, more data are needed to confirm this finding and to investigate the underlying causes. Further behavioral and genetic data will be collected in my upcoming field seasons to investigate social relationships, dispersal

patterns, and the prevalence and characteristics of female-female competition in this population of ursine colobus. This research will further our understanding of the evolution of primate social organization and structure.

Investigating Palaeodiet Using Multiple Tissues from Ancient Peruvian Mummies

Jocelyn Williams, Trent University

As part of a study investigating palaeodiet for the central coast of Peru, a variety of soft tissues were sampled for stable carbon and nitrogen isotope analysis. These soft tissues included (size of sample indicated in parentheses): hair (59), nail (17), skin (58) and muscle (18). For most of these tissues, corresponding bone samples were also available for isotopic analysis. Soft tissues grow/renew at a much faster rate than bone; consequently the isotopic composition of soft tissues reflects short term diet (e.g., weeks and months). In contrast, the isotopic composition of bone reflects long term diet (10-25 years). Isotopic analyses of the soft tissues indicated fluctuations in the proportion of C₃ to C₄ foods in the diet. Comparison of the isotope data from soft tissues against isotope data from bone collagen demonstrated that the types of foods consumed in the short term were similar to the types of foods consumed over the long term. This supports the conclusion that short term fluctuations in diet were likely due to seasonality rather than population mobility. Isotope data for all tissues was pooled to represent the whole animal and compared to isotope data from bone collagen alone, the close agreement between these data indicate the robusticity of bone collagen for isotopic analysis in seasonal environments. This study demonstrates the detailed palaeodiet information that can be gained from isotopic analysis of soft tissues and provides insight into ancient Peruvian subsistence strategies for the central coast of Peru.

